THE LIBRARY
OF
THE UNIVERSITY
OF CALIFORNIA
DAVIS

LIBRARY COPY

QK
4
.3
3
21

STATE OF CALIFORNIA
DEPARTMENT OF NATURAL RESOURCES
KENNETH L. FULTON, Director

DIVISION OF MINES
FERRY BUILDING, SAN FRANCISCO

WALTER W. BRADLEY — State Mineralogist

San Francisco] BULLETIN No. 121 [Sept. 1941

CALIFORNIA MINERAL PRODUCTION

AND

DIRECTORY OF MINERAL PRODUCERS

FOR 1940

UNIV. OF
DAVIS

STATE OF CALIFORNIA
DEPARTMENT OF NATURAL RESOURCES
KENNETH I. FULTON, Director

DIVISION OF MINES
FERRY BUILDING, SAN FRANCISCO

WALTER W. BRADLEY — State Mineralogist

San Francisco] BULLETIN No. 121 [Sept. 1941

CALIFORNIA MINERAL PRODUCTION

AND

DIRECTORY OF MINERAL PRODUCERS

FOR 1940

By
HENRY H. SYMONS

7379

CONTENTS

Page

LETTER OF TRANSMITTAL 7

INTRODUCTION 9

CHAPTER I

SUMMARY OF THE MINERAL INDUSTRY IN CALIFORNIA DURING THE YEAR OF 1940 11
TABULATION OF THE MINERAL PRODUCTION, SHOWING COMPARATIVE AMOUNTS AND VALUES—1939 AND 1940 12
TABLE SHOWING COMPARATIVE MINERAL PRODUCTION OF THE VARIOUS COUNTIES IN CALIFORNIA FOR 1939 AND 1940 13
TOTAL PRODUCTION, 1887-1940 14

CHAPTER II

FUELS (HYDROCARBONS)—
INTRODUCTORY 15
COAL 15
NATURAL GAS 16
PETROLEUM 19

CHAPTER III

METALS—
INTRODUCTORY 32
ALUMINUM 32
ANTIMONY 33
ARSENIC 33
BERYLLIUM 34
BISMUTH 34
CADMIUM 35
CHROMITE 35
COBALT 37
COPPER 37
GOLD 39
IRIDIUM. (*See* Platinum.)
IRON 44
LEAD 45
MANGANESE 46
MOLYBDENUM 47
NICKEL 48
OSMIUM. (*See* Platinum.)
PALLADIUM. (*See* Platinum.)
PLATINUM 49
QUICKSILVER 50
SILVER 51
TIN 54
TITANIUM 55
TUNGSTEN 55
VANADIUM 57
ZINC 57

CHAPTER IV

STRUCTURAL MATERIALS—
INTRODUCTORY 59
ASPHALT 59
BITUMINOUS ROCK 60
BRICK AND HOLLOW TILE 61
CEMENT 62
GRANITE 64
LIME 66
MAGNESITE 66
MARBLE 68
ONYX AND TRAVERTINE 69
SANDSTONE 70
SERPENTINE 70
SLATE 71
STONE—MISCELLANEOUS 72
Paving Blocks 73
Grinding-Mill Pebbles 74
Sand and Gravel 74
Crushed Rock 76

CHAPTER V

Page

INDUSTRIAL MATERIALS—
Introductory ---- 79
Asbestos ---- 80
Barite ---- 81
Bentonite (Fuller's Earth) ---- 82
Calcium Silicate ---- 83
Carbon Dioxide Gas ---- 84
Clay—Pottery ---- 84
Diatomite ---- 88
Dolomite ---- 89
Feldspar ---- 90
Fluorspar ---- 91
Garnets (Abrasive) ---- 91
Gems ---- 92
Graphite ---- 93
Gypsum ---- 94
Limestone ---- 95
Lithia ---- 97
Mica ---- 97
Mineral Paint ---- 99
Mineral Water ---- 99
Phosphates ---- 101
Pumice and Volcanic Ash ---- 101
Pyrites ---- 102
Shale Oil ---- 103
Silica (Sand and Quartz) ---- 103
Sillimanite-Andalusite-Kyanite Group ---- 105
Soapstone and Talc ---- 106
Strontium ---- 108
Sulphur ---- 109
Zircon ---- 110

CHAPTER VI

SALINES—
Introductory ---- 110
Alum Minerals ---- 111
Borates ---- 111
Bromine ---- 113
Calcium Chloride ---- 114
Iodine ---- 114
Magnesium Salts ---- 115
Nitrates ---- 116
Potash ---- 116
Salt ---- 118
Soda ---- 119

CHAPTER VII

MINERAL PRODUCTION OF CALIFORNIA BY COUNTIES—
Introductory ---- 121
Alameda ---- 122
Alpine ---- 122
Amador ---- 123
Butte ---- 123
Calaveras ---- 124
Colusa ---- 124
Contra Costa ---- 124
Del Norte ---- 125
El Dorado ---- 125
Fresno ---- 126
Glenn ---- 126
Humboldt ---- 126
Imperial ---- 127
Inyo ---- 127
Kern ---- 128
Kings ---- 128
Lake ---- 129
Lassen ---- 129
Los Angeles ---- 129
Madera ---- 130
Marin ---- 130
Mariposa ---- 131
Mendocino ---- 131
Merced ---- 131
Modoc ---- 132
Mono ---- 132
Monterey ---- 133
Napa ---- 133
Nevada ---- 133
Orange ---- 134
Placer ---- 134

MINERAL PRODUCTION OF CALIFORNIA BY COUNTIES—Continued Page
Plumas ---- 135
Riverside ---- 135
Sacramento ---- 136
San Benito ---- 136
San Bernardino ---- 136
San Diego ---- 137
San Francisco ---- 137
San Joaquin ---- 138
San Luis Obispo ---- 138
San Mateo ---- 138
Santa Barbara ---- 139
Santa Clara ---- 139
Santa Cruz ---- 140
Shasta ---- 140
Sierra ---- 141
Siskiyou ---- 141
Solano ---- 141
Sonoma ---- 142
Stanislaus ---- 142
Sutter ---- 143
Tehama ---- 143
Trinity ---- 143
Tulare ---- 144
Tuolumne ---- 144
Ventura ---- 144
Yolo ---- 145
Yuba ---- 145

Chapter VIII

DIRECTORY OF PRODUCERS OF METALLIC AND NONMETALLIC MINERALS IN CALIFORNIA, 1940—
Introductory ---- 147
Antimony ---- 148
Barites ---- 148
Bentonite (Fuller's Earth) ---- 149
Bituminous Rock ---- 149
Borates ---- 150
Bromine ---- 150
Calcium Chloride ---- 150
Calcium Silicate ---- 151
Carbon Dioxide Gas ---- 151
Cement ---- 152
Chromite ---- 153
Clay ---- 154
Coal ---- 158
Copper ---- 158
Diatomite ---- 159
Dolomite ---- 159
Feldspar ---- 160
Gems ---- 160
Gold ---- 161
Granite ---- 169
Gypsum ---- 170
Iodine ---- 171
Iron ---- 171
Lead ---- 172
Lime and Limestone ---- 173
Lithia ---- 174
Magnesite ---- 174
Magnesium Salts ---- 174
Manganese Ore ---- 175
Marble (including Onyx and Travertine) ---- 175
Mica ---- 175
Mineral Water ---- 176
Molybdenum Ore ---- 177
Platinum ---- 178
Potash ---- 178
Pumice and Volcanic Ash ---- 179
Pyrite ---- 179
Quicksilver ---- 180
Salt ---- 182
Sandstone ---- 183
Silica (Sand and Quartz) ---- 183
Sillimanite-Andalusite-Cyanite Group ---- 184
Silver ---- 184
Slate ---- 186
Soapstone and Talc ---- 186
Soda ---- 187
Stone, Miscellaneous ---- 188
Strontium ---- 196
Sulphur ---- 196
Titanium ---- 196
Tungsten ---- 197
Smelters, Custom Mills, Ore and Metal Buyers ---- 198
Zinc ---- 198

APPENDIX

Page
PUBLIC RESOURCES CODE 199
DIVISION I—DEPARTMENT OF NATURAL RESOURCES 200
DIVISION II—MINES AND MINING 201
PUBLICATIONS OF DIVISION OF MINES 203
INDEX 221

ILLUSTRATIONS

Cyanide plant of Yellow Aster Mine, Randsburg, Kern County 39
Headframe and mill of Keystone Mine, Amador City, Amador County 42
Zaca Mine near Markleeville, Alpine County 52
Pine Creek Tungsten Mine, upper (pilot) mill, 500 tons capacity, of the U. S. Vanadium Corp., near Bishop, Inyo County 56
Cement plant of Permanente Corp., near Los Altos, Santa Clara County 63
A section of the 9-mile conveyor belt transporting sand and gravel from Redding to the Shasta Dam, Shasta County 74
Plant of Los Angeles Brick and Clay Products Co., at Alberhill, Riverside County 87
Weisel Silica Sand Plant near Corona, Riverside County 104
Plant of Leviathan Sulphur Mine, Alpine County 109
West End Chemical Company plant at West End, on Searles Lake, San Bernardino County 112
Coring a new well on Searles Lake, San Bernardino County, by the American Potash and Chemical Company for potash-borax-soda-bearing brine 117
Natural Soda Products Co., evaporating sprays and pond, at Keeler, on Owens Lake, Inyo County 120

LETTER OF TRANSMITTAL

September, 1941

To His Excellency, The Honorable Culbert L. Olson,
Governor of the State of California.

Sir: I have the honor to herewith transmit Bulletin No. 121 of the Division of Mines, of the Department of Natural Resources, being the annual report of the statistics of the mineral production of California.

The remarkable variety, total values, and wide distribution of many of our minerals revealed herein show California's importance as a producer of commercial minerals among the states of the Union.

Respectfully submitted.

Kenneth I. Fulton,
Director, Department of Natural Resources

INTRODUCTION

It is the endeavor of the staff of the State Division of Mines (formerly State Mining Bureau), in these annual reports of the mineral industries of California, to so compile the statistics of production that they will be of actual use to producers and to those interested in the utilization of the mineral products of our State, while at the same time keeping the individual's data confidential. In addition to the mere figures of output, we have included descriptions of the uses and characteristics of many of the materials, as well as a brief mention of their occurrences.

The compilation of accurate and dependable figures is an extremely difficult undertaking, and the State Mineralogist takes the opportunity of here expressing his appreciation of the cooperation of the producers in makng this work possible. A fuller appreciation of the value of early responses to the requests sent out in January will result in earlier completion of the manuscript. Statistics lose much of their value if their publication is unnecessarily delayed.

Some of the data relative to properties and uses of many of the minerals herein described are repeated from preceding reports, as it is intended that this annual statistical bulletin shall be somewhat of a compendium of information on California's commercial minerals and their utilization.

WALTER W. BRADLEY,
State Mineralogist.

MINERAL INDUSTRY, CALIFORNIA, 1940

DATA COMPILED FROM DIRECT RETURNS FROM PRODUCERS IN ANSWER TO INQUIRIES SENT OUT BY THE CALIFORNIA STATE DIVISION OF MINES, FERRY BUILDING, SAN FRANCISCO, CALIFORNIA

CHAPTER ONE

The total value for the mineral output for California for the year 1940 was $342,825,817, being a decrease of $9,636,747 from the total of 1939 which was $352,462,564, the decrease being due to petroleum. There were sixty-two different mineral substances, exclusive of a segregation of various stones grouped under gems; and all fifty-eight counties of the State constributed to the list.

As revealed by the following, salient features of 1940 as compared with the previous year were: All groups of mineral substances, such as metals, structural materials, industrial minerals and salines showed an increase in total value, with the exception of the fuels which showed a decreased value. Of the year's mineral output quicksilver showed the greatest increase in value followed in turn by cement, miscellaneous stone, tungsten ore, gold, copper, magnesite, soda, mineral water, etc.; while decreases in amount and value were shown by petroleum, natural gas, brick and hollow building tile, and potash. The greatest annual value for their output in California was recorded by lime, limestone, molybdenum ore, gypsum, silica (glass sand), soda, and sulphur.

Of the fuels, petroleum showed a decrease in value of $20,879,056 and a decrease in amount from 224,253,110 barrels to 223,394,805 barrels of crude oil. In the early part of the year there was a cut in prices paid for all grades of crude, in most fields. Natural gas showed an increase in amount used but a decrease in total value from 340,754,804 M cubic feet worth $21,551,646 to 352,871,945 M cubic feet worth $20,618,893.

Of the metals all materials under this group showed an increase in amount and value with the exception of chromite, iron ore, and silver. The highest value of output since 1856 being recorded for gold, for quicksilver since 1876, for tungsten since 1918, and all times for molybdenum. The gold production increased from 1,435,264 fine ounces to 1,455,671 fine ounces in amount and in value from $50,234,240 to $50,948,485. Quicksilver increased from 11,201 flasks worth $1,102,563 to 18,907 flasks worth $3,209,754; tungsten from 74,110 units worth $1,153,735 to 107,022 units valued at $2,267,135, copper from 8,390,215 pounds worth $872,582 to 12,833,363 pounds worth $1,450,170; with increased values recorded by molybdenum ore, lead, platinum group metals, zinc, antimony, and manganese. The quicksilver miner received in 1940 the highest average annual price per flask ever paid in this State, which was $167.77.

Of the structural materials; cement increased in amount and value from 10,984,033 barrels worth $15,616,219 to 13,955,255 barrels valued at $17,673,202; lime from 87,288 tons worth $849,122 to 101,395 tons valued at $902,322; miscellaneous stone increased in value from $10,316,787 to $12,181,564; and the group increasing in total from $30,373,840 to $34,739,419.

The industrial group showed an increased total value from $5,622,449 to $6,388,748, with bentonite, pottery clay, diatomite, dolomite, gypsum, limestone, mineral water, silica (quartz and glass sand), and sulphur showing increased total values for the year. The total value of the saline group $13,178,499 to $13,674,519, with borates, bromine, iodine, magnesium salts, salt, and soda registering increases in total value for the year and potash the only one of this group showing a decrease in total value.

By Substances.

The following table shows the comparative yield of mineral substances of California for 1939 and 1940, as compiled from the returns received at the State Division of Mines, San Francisco, in answer to inquiry sent to producers:

Substance	1939		1940		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Antimony	150 tons	$4,552	56,845 lbs.	$7,958	$3,396+
Bentonite	11,284 tons	138,854	10,360 tons	174,002	35,148+
Bituminous rock	16,546 tons	63,612	*	*	* +
Borates	244,819 tons	5,110,807	212,358 tons	5,254,154	143,347+
Brick and hollow building tile		3,063,660		2,762,885	300,775—
Carbon dioxide	*	*	97,660 M cu.ft.	23,877	* +
Cement	10,984,033 bbls.	15,616,219	13,955,255 bbls.	17,673,202	2,056,983+
Chromite	3,936 tons	52,673	2,599 tons	32,796	19,877—
Clay (pottery)	305,519 tons	611,599	324,399 tons	687,871	76,272+
Copper	8,390,215 lbs.	872,582	12,833,363 lbs.	1,450,170	577,588+
Dolomite	17,791 tons	40,391	18,178 tons	52,167	11,776+
Feldspar	2,076 tons	12,510	3,022 tons	16,644	4,134+
Gems		2,500		3,176	676+
Gold	1,435,264 fine ozs.	50,234,240	1,455,671 fine ozs.	50,948,485	714,245+
Granite		145,194		198,896	53,702+
Gypsum	219,671 tons	437,343	314,834 tons	599,944	162,601+
Iron ore	16,990 tons	77,788	*	*	* —
Lead	1,061,294 lbs.	49,880	3,092,636 lbs.	154,632	76,844+
Lime	87,288 tons	849,122	101,395 tons	902,322	53,200+
Limestone	316,029 tons	838,235	563,999 tons	895,832	57,597+
Magnesium salts	3,894 tons	382,457	4,325 tons	419,666	37,209+
Manganese ore			314 tons	3,260	* +
Marble[a]		14,822		15,189	467+
Mineral water	16,678,741 gals.	735,988	16,190,549 gals.	960,701	224,713+
Natural gas	340,754,804 M cu.ft.	21,551,646	352,871,945 M cu.ft.	20,618,893	932,753—
Petroleum	224,253,110 bbls.	226,358,856	223,294,805 bbls.	207,479,800	18,879,056—
Platinum metals	896 fine ozs.	32,135	1,358 fine ozs.	62,419	30,284+
Pumice and volcanic ash	40,109 tons	159,951	35,162 tons	126,516	33,435—
Quicksilver	11,201 flasks	1,102,563	18,907 flasks	3,209,754	2,107,191+
Salt	417,956 tons	1,174,386	462,282 tons	1,290,728	116,347+
Sandstone		12,494		13,083	589+
Silica (quartz and glass sand)	86,229 tons	349,074	101,041 tons	376,723	27,649+
Silver	2,599,139 fine ozs.	1,764,264	2,359,776 fine ozs.	1,678,063	86,201—
Slate	5,777 tons	28,327	4,777 tons	18,031	10,296—
Soapstone and talc	31,820 tons	372,078	37,433 tons	329,425	42,653—
Soda	200,049 tons	2,055,608	228,108 tons	2,339,639	284,031+
Stone, miscellaneous[b]		10,316,787	23,184,186 tons	12,181,564	1,864,777+
Strontium	*	*	627 tons	8,686	* +
Sulphur	4,811 tons	73,741	8,156 tons	105,619	31,878+
Tungsten ore	1,235 tons	1,153,735	107,022 units WO_3	2,267,135	1,113,400+
Zinc	16,390 lbs.	852	182,088 lbs.	11,472	10,720+
Unapportioned		[c]6,601,039		[d]7,470,438	869,399+
Total values		$352,462,564		$342,825,817	
Net decrease					$9,636,747

* Included under 'Unapportioned.'

[a] Includes onyx and travertine.

[b] Includes macadam, crushed rock, ballast, rubble, riprap, sand and gravel.

[c] Includes barite, bromine, calcium chloride, calcium silicate, carbon dioxide, coal, diatomite, garnets, iodine, lithia, magnesite, manganese ore, molybdenum, potash, paving blocks, pyrite, sillimanite group, strontium, titanium, tube-mill pebbles.

[d] Includes barite, bituminous rock, bromine, calcium chloride, calcium silicate, coal, diatomite, iodine, iron ore, lithia, magnesite, molybdenum ore, potash, pyrite, sillimanite group, titanium, zircon, mica, tube-mill pebbles, paving blocks.

By Counties.

The following table shows the comparative value of the mineral production of the various counties in the State for the years 1939 and 1940:

County	1939	1940
Alameda	$2,778,587	$3,697,648
Alpine	7,328	18,211
Amador	4,314,573	4,284,886
Butte	2,217,721	2,722,816
Calaveras	5,392,940	4,233,835
Colusa	20,149	45,337
Contra Costa	2,206,131	1,960,631
Del Norte	13,101	24,689
El Dorado	3,277,679	2,094,405
Fresno	21,275,300	22,103,968
Glenn	54,591	16,891
Humboldt	133,150	133,590
Imperial	822,271	461,180
Inyo	1,614,597	2,855,646
Kern	62,105,687	62,855,732
Kings	16,647,443	13,649,445
Lake	451,575	884,427
Lassen	46,277	14,869
Los Angeles	113,577,646	98,183,754
Madera	119,831	110,074
Marin	133,756	151,800
Mariposa	1,755,776	1,224,336
Mendocino	47,691	109,110
Merced	2,611,896	2,514,323
Modoc	23,658	93,042
Mono	513,357	666,280
Monterey	229,058	307,177
Napa	714,895	829,589
Nevada	11,468,556	11,351,165
Orange	18,850,782	17,575,147
Placer	1,710,738	2,023,484
Plumas	2,265,956	2,743,608
Riverside	3,187,902	3,918,747
Sacramento	5,875,597	5,928,834
San Benito	547,093	1,401,496
San Bernardino	14,664,598	15,772,742
San Diego	633,147	845,207
San Francisco	52,669	52,205
San Joaquin	1,104,898	1,146,912
San Luis Obispo	174,124	491,329
San Mateo	2,418,895	2,620,611
Santa Barbara	8,911,006	8,045,351
Santa Clara	716,346	3,229,052
Santa Cruz	3,140,742	2,779,306
Shasta	2,058,547	2,799,796
Sierra	871,212	969,323
Siskiyou	1,847,687	2,219,203
Solano	640,024	709,435
Sonoma	329,069	432,760
Stanislaus	1,069,730	1,558,205
Sutter	68,733	94,054
Tehama	82,094	51,880
Trinity	1,514,951	1,772,327
Tulare	452,547	220,065
Tuolumne	669,844	1,032,567
Ventura	20,773,214	20,647,881
Yolo	63,143	109,820
Yuba	3,192,056	4,035,614
Total value	$352,462,564	$342,825,817

Total Mineral Production of California, by Years, Since 1887.

The following tabulation gives the total value of mineral production of California by years since 1887, in which year compilation of such data by the State Mining Bureau (now Division of Mines) began. At the side of these figures have been placed the values of the most important metal and nonmetal items—gold and petroleum.

In the same period copper made an important growth beginning with 1897 following the entry of the Shasta County mines, and later

Plumas County. Cement increased rapidly from 1902, while crushed rock, sand and gravel as a group paralleled the cement increase. Quicksilver has been up and down. Mineral water and salt have always been important items, but the values fluctuate. Borax has increased materially since 1896. War-time increases, 1915–1918, were shown by chromite, copper, lead, magnesite, manganese, silver, tungsten and zinc. Most of these later declined, though silver, structural materials and copper increased in 1920–1924. Natural gas showed a steady increase from 1907, and in 1928–1933 its value was second only to petroleum. In 1939–1940 increases in output similar to those of 1915–1918 were shown by many mineral substances.

In 1929 the annual output of gold was the smallest since its discovery. From 1929 to 1940 there was a rapid increase in gold production, due in part to the raise in its price per ounce.

Total Mineral Production of California, by Years, Since 1887

Year	Total value of all minerals	Gold, value	Petroleum, value
1887	$19,785,868	$13,588,614	$1,357,144
1888	19,469,320	12,750,000	1,380,666
1889	16,681,731	11,212,913	368,048
1890	18,039,666	12,309,793	384,200
1891	18,872,413	12,728,869	401,264
1892	18,300,168	12,571,900	561,333
1893	18,811,261	12,422,811	608,092
1894	20,203,294	13,923,281	1,064,521
1895	22,844,663	15,334,317	1,000,235
1896	24,291,398	17,181,562	1,180,793
1897	25,142,441	15,871,401	1,918,269
1898	27,289,079	15,906,478	2,376,420
1899	29,313,460	15,336,031	2,660,793
1900	32,622,945	15,863,355	4,152,928
1901	34,355,981	16,989,044	2,961,102
1902	35,069,105	16,910,320	4,692,189
1903	37,759,040	16,471,264	7,313,271
1904	43,778,348	19,109,600	8,317,809
1905	43,069,227	19,197,043	9,007,820
1906	46,776,085	18,732,452	9,238,020
1907	55,697,949	16,727,928	16,783,943
1908	66,363,198	18,761,559	26,566,181
1909	82,972,209	20,237,870	32,398,187
1910	88,419,079	19,715,440	37,689,542
1911	87,497,879	19,738,908	40,552,088
1912	88,972,385	19,713,478	41,868,344
1913	98,644,639	20,406,958	48,578,014
1914	93,314,773	20,653,496	47,487,109
1915	96,663,369	22,442,296	43,503,837
1916	127,901,610	21,410,741	57,421,334
1917	161,202,962	20,087,504	86,976,209
1918	199,753,837	16,529,162	127,459,221
1919	195,830,002	16,695,955	142,610,563
1920	242,099,667	14,311,043	178,394,937
1921	268,157,472	15,704,822	203,138,225
1922	245,183,826	14,670,346	173,381,265
1923	344,024,678	13,379,013	242,731,309
1924	374,620,789	13,150,175	274,652,874
1925	434,519,660	13,065,330	330,609,829
1926	450,330,856	11,923,481	345,546,677
1927	366,781,394	11,671,018	260,735,498
1928	332,224,233	10,785,315	229,998,680
1929	432,248,228	8,526,703	321,366,863
1930	365,604,695	9,451,162	271,699,046
1931	215,964,420	10,814,162	141,835,723
1932	199,196,493	11,765,726	142,880,247
1933	206,489,058	15,683,075	143,063,972
1934	237,374,709	25,131,284	159,529,671
1935	263,404,317	31,165,050	179,335,311
1936	327,804,268	37,710,470	211,667,185
1937	361,515,951	41,110,230	237,845,872
1938	380,444,976	45,889,515	258,345,343
1939	352,462,564	50,234,240	226,358,856
1940	342,825,817	50,948,485	207,479,800
Totals	$8,739,587,455	$1,014,621,988	$5,551,446,672

CHAPTER TWO

FUELS

Among the most important mineral products of California are its fuels. This subdivision includes coal, natural gas, and petroleum, the combined values of which make up practically 65 per cent of the State's entire mineral output for the year 1940.

There are deposits of peat known in several localities in California, small amounts of which are used as a fertilizer, and in stockfood preparations, but none has yet been recorded as utilized for fuel.

Comparison of values during 1939 and 1940 is shown in the following table:

Substance	1939		1940		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Coal	*	*	*	*	* —
Natural gas	340,754,804 M cu. ft.	$21,551,646	352,871,945 M cu. ft.	$20,618,893	$932,753—
Petroleum	224,253,110 gals.	226,358,856	223,294,805 bbls.	207,479,800	18,879,056—
Total value		$247,910,502		$228,098,693	
Net decrease					$19,811,809

* Included under unapportioned.

COAL

Bibliography: State Mineralogist Reports VII, XII-XV (inc.), XVII, XIX-XXVIII (inc.), XXVI, XXXI, XXXV. U. S. Geol. Surv., Bulletins 285, 316, 431, 471, 581; Ann. Rept. 22, Pc. III.

The coal produced in California during 1940 is concealed under the 'Unapportioned' item so as not to reveal the output of a single producer each in Fresno and Contra Costa counties. The 1939 output came from a property in Contra Costa County. The 1939-1940 total production amounted to 1,750 short tons valued at $8,100 f.o.b. mine. This coal was consumed by the local market and also used on the property for camp purposes, power and forge, to carry on regular operations and development work.

Total Coal Production of California.

The very considerable output of coal in the years previous to 1883 was almost entirely from the Mount Diablo district, Contra Costa County. Later the Tesla mine in Corral Hollow, Alameda County, was an important producer for a few years. Stone Canyon, Monterey County, was also an important producer for a short time, and there has been some coal shipped from properties in Amador, Fresno, Orange, Riverside, Siskiyou and Trinity counties. The following tabulation gives the annual tonnages and values, according to available records:

Total Coal Production of California.

Coal Output and Value, by Years

Year	Tons	Value	Year	Tons	Value
1861	6,620	$38,065	1902	88,460	$248,622
1862	23,400	134,550	1903	93,026	265,383
1863	43,200	248,400	1904	79,062	376,494
1864	50,700	291,525	1905	46,500	144,500
1865	60,530	348,048	1906	24,850	61,600
1866	84,020	483,115	1907	23,734	55,849
1867	124,690	716,968	1908	18,496	55,503
1868	143,676	826,137	1909	49,389	216,913
1869	157,234	904,096	1910	11,033	23,484
1870	141,890	815,868	1911	11,047	18,297
1871	152,493	876,835	1912	14,484	39,092
1872	190,859	1,097,439	1913	25,198	85,809
1873	186,611	1,073,013	1914	11,859	28,806
1874	215,352	1,238,274	1915	10,299	26,662
1875	166,638	958,169	1916	4,037	7,030
1876	128,049	736,282	1917	3,527	7,691
1877	107,789	619,787	1918	6,343	16,149
1878	134,237	771,863	1919	2,983	8,203
1879	147,879	850,304	1920	2,078	5,450
1880	236,950	1,362,463	1921	12,467	63,578
1881	140,000	805,000	1922	27,020	135,100
1882	112,592	647,404	1923	1,010	5,090
1883	76,162	380,810	1924	1,425	8,800
1884	77,485	309,950	1925	730	3,880
1885	71,615	286,460	1926	1,100	5,000
1886	100,000	300,000	1927	200	1,100
1887	50,000	150,000	1928	782	4,542
1888	95,000	380,000	1929	450	2,476
1889	121,280	288,232	1930	10,885	59,858
1890	110,711	283,019	1931	12,551	77,607
1891	93,301	204,902	1932	9,508	36,468
1892	85,178	209,711	1933	2,612	11,367
1893	72,603	167,555	1934	13,549	52,720
1894	59,887	139,862	1935	8,049	32,745
1895	79,858	193,790	1936	370	1,815
1896	70,649	161,335	1937	269	2,933
1897	87,449	196,255	1938	275	1,650
1898	143,045	337,475	1939*	1,750	8,100
1899	160,941	420,109	1940*		
1900	176,956	535,531			
1901	150,724	401,772	Totals	5,269,660	$23,396,739

The tonnages in the above table for the years 1861-1866 (incl.) are taken from the U. S. Geological Survey, "Mineral Resources of the U. S., 1910," p. 107. The values assigned for the years previous to 1883 are those given by W. A. Goodyear (Mineral Res., 1882, pp. 93-94), being an average of $5.75 per ton. From 1887 to date the figures are those of the California State Mining Bureau.

* Annual details concealed under 'Unapportioned.'

NATURAL GAS

Bibliography: State Mineralogist Reports VII, X, XII, XIII, XIV, XXIX, XXXV. Bulletins 3, 16, 19, 69, 73, 89, 118. Summary Oil and Gas Supervisor, Dec., 1919; Aug., 1922; Mar., 1923; Mar. and Apr., 1926.

Statistics on the production of natural gas in California are in a considerable degree difficult to arrive at, as much of it that is utilized directly at the wells for heating, lighting, and driving gas engines is not measured. Hence, it is necessary to approximate the output of many of the operators in the oil fields, estimated on the number of lights, and on the number and horsepower of gas engines and steam boilers thus operated. The figures here given are for gas utilized locally and also that sold for distribution to consumers; and we consider are not overestimated, particularly in the seven oil-producing counties. It must be remembered that some of our important oil fields are removed many miles from the site of any other industry, and that the gathering of small amounts of gas and transporting it for any considerable distance

may not always be profitable, nor is it often possible to have pipe-line facilities available to handle the gas accompanying the early gas production in newly developed fields. Wherever feasible, casing-head gas is used in driving gas engines for pumping and drilling, and in firing the boilers of steam-driven plants.

Actual Production of Natural Gas—How Disposed of in California—1940

County	Production, M cubic feet	Stored, M cubic feet	Unconserved wasted, M cubic feet	Utilized, M cubic feet
Fresno	62,969,691	68,226	1,501,377	61,400,088
Kern	87,402,461	4,745,500	3,247,480	79,409,481
Kings	36,902,100		886,059	36,016,041
Los Angeles	118,744,054	410,305	20,223,838	98,109,911
Orange	16,283,168	26,934	444,145	15,812,089
San Joaquin	9,040,674		2,962	9,037,712
Santa Barbara	5,073,729		347,586	4,726,143
Solano	8,213,065		2,419	8,210,646
Ventura	40,103,769	702,803	1,319,867	38,081,099
Other counties	2,068,735			2,068,735
Totals	386,801,446	5,953,768	27,975,733	352,871,945

Production and Value.

There is a rather wide variation in prices quoted for natural gas because a considerable part is used directly in the field for driving gas engines and firing boilers, and is therefore not measured nor sold. Such companies as have placed a valuation on the gas that was thus used in 1940 gave from 1.5¢ to 25¢ per 1000 cu. ft. at the well. From the totals shown in the tabulation following herein, the average value for all fields in 1940 works out at approximately 5.84¢ per M cu. ft. Approximately 7000 cu. ft. of gas is equal to one barrel of oil in heating value, and is so accounted for by many operators. In driving gas engines, about 4000 cu. ft. per 24 hr. are consumed by a 25-h.p. engine, and 63,700 cu. ft. per day for heating a 70-h.p. steam boiler, which figures have been utilized in compiling this report, in those cases where gas was not metered.

Utilized Production of Natural Gas in California, 1940

County	M cubic feet	Value
Fresno	61,400,088	$3,139,811
Kern	79,409,481	4,257,590
Kings	36,016,041	2,018,422
Los Angeles	98,109,911	6,462,762
Orange	15,812,089	1,071,924
San Joaquin	9,037,712	574,452
Santa Barbara	4,726,143	305,203
Solano	8,210,646	666,790
Ventura	38,081,099	1,982,242
Butte, Humboldt, Lake, Mendocino, Sacramento, Sutter, Tulare, Yolo*	2,068,735	139,697
Totals	352,871,945	$20,618,893

* Combined to conceal the output of individual operators in each.

The above showed an increase in total amount with a decrease in value as compared with the figures of the previous year, which were 340,754,805 M cu. ft. worth $21,551,646. Los Angeles County led all

others in the yield of natural gas during 1940, followed in turn by Kern, Fresno, Ventura, and Kings counties. Increased total value of output was reported in Fresno, Los Angeles, Solano, and Sutter counties; while lower total values were shown by all other producing counties.

Natural Gas Production in California Since 1888.

The production of natural gas in California by years since 1888 is given in the following table. The first economic use of natural gas in California was from the famous courthouse well at Stockton, bored in 1854-1858. Beginning about 1883 and for several succeeding years, a number of gas wells were brought in around Stockton, and later at Sacramento. Natural gas was known in a number of other localities, and occasionally utilized in a small way, notably at Kelseyville in Lake County, and in Humboldt County near Petrolia and Eureka, but there are no available authentic records of amounts or values previous to the year 1888. The most important developments in the commercial production of natural gas have been coincident with developments in the oil fields, by utilizing the casing-head gas as well as that from dry-gas wells.

Natural Gas Production in California Since 1888

Year	M cubic feet	Value	Year	M cubic feet	Value
1888	[a]12,000	$10,000	1915	21,992,892	$1,706,480
1889	[a]14,500	12,680	1916	28,134,365	2,871,751
1890	[a]41,250	33,000	1917	44,343,020	2,964,922
1891	[a]39,000	30,000	1918	46,373,052	3,289,524
1892	[a]75,000	55,000	1919	52,173,503	4,041,217
1893	[a]84,000	68,500	1920	58,567,772	3,898,286
1894	[ab]85,000	75,000	1921	67,043,797	4,704,678
1895	[ab]110,000	100,000	1922	103,628,027	6,990,030
1896	[ab]131,000	110,157	1923	240,405,397	15,661,433
1897	[a]71,300	62,657	1924	209,021,596	15,153,140
1898	[a]111,165	74,424	1925	194,719,924	15,890,082
1899	115,110	95,000	1926	214,549,477	19,465,347
1900	40,566	34,578	1927	224,686,940	20,447,294
1901	120,800	92,034	1928	260,887,116	22,260,947
1902	120,968	99,443	1929	400,129,201	29,675,546
1903	120,134	75,237	1930	315,513,952	24,559,840
1904	144,437	91,035	1931	344,959,920	16,690,695
1905	148,345	102,479	1932	284,168,872	16,272,061
1906	168,175	109,489	1933	271,743,544	15,403,514
1907	169,991	114,759	1934	263,207,517	14,408,761
1908	842,883	474,584	1935	302,447,193	17,680,661
1909	1,148,467	616,932	1936	298,922,708	18,585,970
1910	10,579,933	1,676,367	1937	323,883,714	19,859,865
1911	[a]5,000,000	491,859	1938	332,358,439	22,310,755
1912	[a]12,600,000	940,076	1939	340,754,804	21,551,646
1913	14,210,836	1,053,292	1940	352,871,945	20,618,983
1914	16,529,963	1,049,470	Totals	5,661,223,510	$384,711,510

[a] Quantity, in part, estimated, where values only were reported.
[b] Tabulations published previously to 1933 included values of CO_2, now shown under "Industrial Materials."

Gasoline from Natural Gas.

More or less gas usually accompanies the petroleum in the old fields, and such gas carries varying amounts of gasoline. A total of 91 plants were in operation in 1939 recovering gasoline by compression or absorption from this 'casing-head' gas. After the gasoline is extracted the remaining 'dry gas' so far as practicable is taken into pipe lines, by which it is distributed to consumers, both domestic and commercial.

A total of 560,762,325 gallons of natural gas gasoline valued at $28,565,993 was reported from all fields by 90 plants during 1940, as compared with 580,655,012 gallons worth $32,370,041 from 91 plants in 1939. In 1940 there was also a total of 50,822,380 gallons of liquefied petroleum gas, compared with 33,953,424 gallons for the previous year. The liquefied petroleum gas was used for chemical manufacturing, industrial, and domestic fuel. The 1940 output was as follows:

County	Number plants	Natural gas, gallons	Gasoline value	Liquid petroleum gas, gallons
Fresno and Kings*	9	118,195,558	$6,197,028	25,755,351
Kern	20	62,942,353	3,057,676	11,814,313
Los Angeles	32	257,762,248	13,278,472	4,362,923
Orange	12	53,689,161	2,631,510	6,107,608
Santa Barbara	7	10,848,895	538,098	602,781
Ventura	10	57,324,110	2,863,209	2,179,404
Totals	90	560,762,325	$28,565,993	50,822,380

* As more natural gas comes from Fresno County but all but two of the natural gas gasoline plants are in Kings County, it is impossible to segregate.

The usual recoveries of gasoline from natural gas vary from ½ gal. to 3 gal. per 1000 cu. ft. of gas handled, the average being about 1 gal. per 1000 cu. ft. The U. S. Bureau of Mines Report by Knudsen[1] gives the average recovery for 1939 as 1.591 gallons per 1000 cu. ft. of gas treated. His figures show the following production by methods:

	M cubic feet natural gas treated	Gallons of gasoline recovered	Recovery gallons per M cu. ft.
Oil absorption	368,260,916	585,993,528	1.591

PETROLEUM

Bibliography: State Mineralogist Reports IV, VII, X, XII, XIII, XXIX, XXXI, XXXIII-XXXV. Bulletins 3, 11, 16, 19, 31, 32, 63, 69, 73, 82, 84, 89, 118. Reports of Oil and Gas Supervisor 1915 to date (issued in monthly chapters since April, 1919, to June, 1929, and quarterly from then on). U. S. Geol. Surv. Bulletins 213, 285, 309, 317, 321, 322, 340, 357, 398, 406, 431, 471, 541, 581, 603, 621, 623, 653, 691. Prof. Papers 116, 117. "American Petroleum; Supply and Demand"; Amer. Petr. Inst., 1925.

The crude petroleum produced in California during 1940 amounted to a total of 223,294,805 barrels having a value of $207,479,800 at the well. This was a decrease in both amount and value compared with the 1939 output which was 224,253,110 barrels worth $226,358,856.

This total of quantity is compiled from the monthly production reports filed by the operators with the State Oil and Gas Supervisor.

The question of the value of the crude oil yield at the well is a difficult one to settle with exactitude principally because a large part of the output is not sold until after refining. The large refiners are also

[1] Knudsen, E. T., The Petroleum Situation in the Pacific Coast Territory (Monthly for 1940), U. S. Bureau of Mines.

large producers of crude oil which they send direct from well to plant, hence much of the crude oil is not sold as such.

The value used in the statistical reports of the State Mining Bureau and the Division of Mines from 1914 to 1927 (inc.) was derived from an average of actual sales of crude oil of all grades in each field of the State and their average applied to the total yield of each respective field. The 1929-1933 values, used by the Division of Mines, were obtained by using the production of crude oil by gravities produced in each field[1] and applying an average of current price quotations for crude oil at the well as compiled by California Oil and Gas Association.

The value given to the 1934-1940 petroleum output by this department was obtained by using the average gravity oil for each field, to which was applied the average quotation for the year of said grade oil.

TABLE A

Production and Value of Crude Oil by Counties

County	1939		1940	
	Barrels	Value	Barrels	Value
Fresno	15,411,056	$18,077,169	17,377,685	$18,562,902
Kern	58,893,865	48,664,001	60,660,165	50,835,439
Kings	9,871,899	14,115,828	9,212,121	11,625,696
Los Angeles	95,906,914	102,083,320	90,696,857	85,342,723
Orange	18,314,989	17,434,038	17,998,175	16,190,394
Santa Barbara	8,944,217	7,423,000	10,270,200	6,365,757
Ventura	16,866,086	18,530,769	17,038,470	18,525,316
San Bernardino, San Luis Obispo, San Mateo, Santa Clara, Tulare*	43,184	30,731	41,132	31,573
Totals	224,253,110	$226,358,856	223,294,805	$207,479,800

* Combined to conceal the output of operators in each.

The foregoing totals show an average price of $0.929 per barrel for the year 1940, as compared with $1.009 in 1939, $1.038 in 1938, $0.997 in 1937, $0.986 in 1936, $0.870 in 1935, $0.913 in 1934, and $0.831 in 1933.

TABLE B

Average Price of Oil per Barrel, by Counties, 1930-1940

County	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940
Fresno	$0.551	$0.556	$0.573	$0.650	$0.941	$1.209	$1.255	$1.261	$1.173	$1.068
Kern	.636	.658	.665	.729	.729	.863	.886	.890	.826	.838
Kings	.723	.837	.934	1.085	1.045	1.338	1.390	1.390	1.430	1.262
Los Angeles	.784	.860	.892	.990	.914	.974	.968	1.064	1.064	.941
Orange	.753	.762	.827	.937	.898	.937	.945	.956	.952	.900
San Luis Obispo		.550								
Santa Barbara	.954	.962	.848	.951	.924	1.143	1.083	.974	.830	.620
Santa Clara		.550								
Ventura	.771	.849	.838	.944	.901	.971	1.050	1.102	1.090	1.087
State averages	$0.753	$0.807	$0.831	$0.913	$0.970	$0.986	$0.997	$1.038	$1.009	$0.929

For several years previous to 1919, the State average value per barrel at the well for crude oil as determined by the statistical returns was noted to practically coincide with the quotations during the same years for 23° gravity oil in the San Joaquin Valley fields. In 1919 and since, the average values have worked out at figures corresponding

[1] By courtesy of Standard Oil Company of California.

to quotations up to, in one year as high as 28° oil, due to the large yield of high-gravity oils from the new fields in the Los Angeles-Orange counties area.

TOTAL PETROLEUM PRODUCTION OF CALIFORNIA

The presence of oil seepages and springs in Los Angeles and Ventura counties was known and utilized in a small way early in the history of California. Some also was shipped to refineries at San Francisco from Santa Barbara and Humboldt counties. In the light of present-day developments, the following reference to the previous year's production of oil and its future prospects as expressed by the San Francisco Bulletin of January 8, 1866, is strikingly prophetic even though skeptical:

"It is possible that the small quantity received (40,000 or 50,000 gallons in 1865) may be the forerunner of many millions which will, at some future time, lubricate the wheels of commerce and set a trade at work excelling in variety any that has thus far been known on this coast. At present, however, we admit to being a little skeptical about the assumption of the astute Professor Silliman that California will be found to have more oil in its soil than all the whales in the Pacific Ocean."

According to Hanks,[1] in 1874 production amounted to 36 bbl. per day from natural flows in Pico Cañon (Newhall), and at Sulphur Mountain (Ventura County), the oil being of 32° gravity average.

"Work was commenced in Pico Canyon in 1875 by drilling three shallow wells with spring pole, all of which yielded oil at depths of from 90 to 250 feet. Actual work of development commenced with steam machinery in 1877."[2]

In 1877 Pico averaged 40-50 bbl. daily, and Ventura 80 bbl. daily. In 1878, there was some production (at 60 bbl. per day, for a time) from wells in Moody Gulch, near Los Gatos, Santa Clara County, the oil being of 46° Baumé.

The first wells in the Coalinga, Fresno County, and Summerland, Santa Barbara County, fields were drilled in 1890, but Coalinga did not make its influence felt conspicuously on the state's annual output until 1903. The Summerland yield never has been large. The Salt Lake field near Los Angeles began production in 1894 and in 1897 reached over a million barrels annually.

In the Kern County fields, the first well was drilled in Sunset in 1891, Midway in 1900, McKittrick in 1892, Kern River in 1899. The Sunset-Midway district attained a yield of over 4,000,000 bbl. in 1909, and over 20,000,000 bbl. in 1910. Kern River field produced over 3,000,000 bbl. in 1901.

The first well in the Santa Maria-Lompoc group, Santa Barbara County, was drilled in 1901, and the district advanced to a yield of over 3,000,000 bbl. annually in 1905.

The Whittier-Fullerton field in Los Angeles and Orange counties became an important factor in 1902. The Montebello field, Los Angeles County, was the conspicuous addition in 1918-1919; and Elk Hills, Kern County, with Huntington Beach and Richfield, Orange County, in 1920. In 1921, the new fields added were Long Beach and Santa Fe Springs, Los Angeles County; in 1922, Torrance field in Los Angeles County, and Wheeler Ridge field in Kern County; but the production

[1] Hanks, Henry G., Report IV of State Mineralogist, p. 298, 1884.

[2] *Idem.* p. 301.

from the large number of new wells started in these new Los Angeles County fields did not reach its peak until August and September, 1923. Dominguez (Compton) came in during 1923; followed by Rosecrans and Inglewood in 1924. Ventura recorded important additions to its producing area in 1925 and 1926. Seal Beach, Orange County, and Mt. Poso, Kern County, were the new fields added in 1926; Round Mountain, Kern County, and Rincon, Ventura County, were the new fields added in 1927; with Potrero in Los Angeles County, Elwood in Santa Barbara County and Kettleman Hills in Kings County in 1928.

During 1929 Playa del Rey was added to the oil fields in Los Angeles County, and more recently a number of others have been added in Fresno, Los Angeles, Kern, and Santa Barbara.

The effect of the advent of these various fields to the producing column will be noted in the tabulation herewith, by years:

TABLE C

Total Petroleum Production in California

Year	Barrels	Value	Year	Barrels	Value
To and including 1875	[a]175,000	[b]$472,500	1909	58,191,723	$32,398,187
1876	12,000	30,000	1910	77,697,568	37,689,542
1877	13,000	29,250	1911	84,648,157	40,552,088
1878	15,227	30,454	1912	89,689,250	41,868,344
1879	19,858	39,716	1913	98,494,532	48,578,014
1880	40,552	60,828	1914	102,881,907	47,487,109
1881	99,862	124,828	1915	91,146,620	43,503,837
1882	128,636	257,272	1916	90,262,557	57,421,334
1883	142,857	285,714	1917	95,396,309	86,976,209
1884	262,000	655,000	1918	99,731,177	127,459,221
1885	325,000	750,750	1919	101,182,962	142,610,563
1886	[a]377,145	[b]870,205	1920	103,377,361	178,394,937
1887	678,572	1,357,144	1921	112,599,860	203,138,225
1888	690,333	1,380,666	1922	138,468,222	173,381,265
1889	303,220	368,048	1923	262,875,690	242,731,309
1890	307,360	384,200	1924	228,933,471	274,652,874
1891	323,600	401,264	1925	232,492,147	330,609,829
1892	385,049	561,333	1926	224,673,281	345,546,677
1893	470,179	608,092	1927	231,195,774	260,735,498
1894	783,078	1,064,521	1928	231,811,465	229,998,680
1895	1,245,339	1,000,235	1929	292,534,221	321,366,863
1896	1,257,780	1,180,793	1930	227,328,988	271,699,046
1897	1,911,569	1,918,269	1931	188,310,605	141,835,723
1898	2,249,088	2,376,420	1932	177,745,286	142,890,247
1899	2,677,875	2,660,793	1933	172,139,362	143,063,972
1900	4,319,950	4,152,928	1934	174,721,282	159,529,671
1901	7,710,315	2,961,102	1935	205,979,855	179,335,311
1902	14,356,910	4,692,189	1936	214,776,227	211,667,185
1903	24,340,839	7,313 271	1937	238,558,562	237,845,872
1904	29,736,003	8,317,809	1938	249,395,763	258,354,343
1905	34,275,701	9,007,820	1939	224,253,110	226,358,856
1906	32,624,000	9,238,020	1940	223,294,805	207,479,800
1907	40,311,171	16,783,943			
1908	48,306,910	26,566,181	Totals	5,595,664,077	$5,555,062,189

[a] U. S. G. S., Min. Res. of U. S., 1886, p. 440, for quantities to and including 1886.

[b] Values have been estimated for the years to and including 1886, after consulting a number of contemporaneous publications, including the Mining & Scientific Press, Reports of the State Mineralogist, and U. S. Reports. The figures for 1887 to date are from records of the State Mining Bureau.

Well Data:

The following table is compiled from monthly statements issued by the American Petroleum Institute:

TABLE D

Wells Operated, by Fields, 1940

Field	Wells producing Dec., 1939	Wells producing Dec., 1940	Wells completed during year	Daily initial output	Wells abandoned during year	Bbls. per well produced per day Dec., 1939	Bbls. per well produced per day Dec., 1940
GROUP No. 1:							
Arvin	13	15	2	2,538	1	183.8	70.2
Belridge—North	76	73	12	4,901	0	155.1	135.5
Belridge—South	83	189			0	13.8	11.4
Canal	31	35	6	4,794	0	191.0	148.2
Canfield Ranch	1	1			0	68.0	43.0
Coalinga	871	907	92	166,843	15	24.4	36.5
Cole's Levee	12	34	20	13,235	3	154.5	139.9
Edison	92	97	10	1,136	3	24.1	28.9
Elk Hills	192	197			0	63.4	61.2
Fruitvale	174	171	1	80	6	35.3	31.1
Greeley	26	38	18	41,799	1	110.7	131.0
Kern River	1,571	1,551	29	355	11	7.3	6.7
Kettleman North Dome	243	268	38	42,760	4	215.2	145.2
Lost Hills	290	265	3	72	1	16.8	13.1
McKittrick	200	198	7	950	1	17.8	18.1
Midway-Sunset	2,572	2,506	26	3,935	34	19.7	19.1
Mountain View	186	175	1	75	16	39.1	34.0
Mount Poso	272	285	6	590	7	39.5	30.8
Paloma	1	5	4	5,166	0	174.0	82.1
Rio Bravo	38	72	34	51,269	2	209.8	147.1
Round Mountain	206	223	6	1,182	7	39.0	34.0
Strand	6	8	4	6,792	0	193.2	172.4
Ten Section	31	71	37	72,116	0	268.6	158.6
Tupman	5	42	38	51,809	1	205.8	156.5
Wasco	7	12	5	15,299	1	159.3	137.8
Wheeler Ridge	33	34			1	10.0	8.9
GROUP No. 2:							
Capital	45	44			2	46.3	39.0
Elwood	81	74			0	49.9	42.9
Rincon	54	69	13	4,102	2	74.4	69.6
San Miguelito	21	27	9	12,923	0	139.5	125.5
Santa Barbara	27	20	1	25	10	10.0	9.3
Santa Maria	270	181	5	3,360	7	54.8	44.5
Santa Maria Valley		142	10	5,013	2		117.8
Summerland	17	8			4	1.6	2.0
Ventura Avenue	275	328	42	68,519	2	132.4	102.5
Ventura-Newhall	552	522	26	17,130	14	12.3	17.9
Watsonville	7	7			0	4.3	3.6
GROUP No. 3:							
Brea-Olinda	356	362	3	464	1	15.6	15.2
Coyote-East	78	85	13	3,671	1	37.2	45.7
Coyote-West	60	78	2	705	0	103.9	113.8
Dominguez	170	200	25	18,476	2	111.2	101.0
El Segundo	47	39			6	59.2	41.0
Huntington Beach	529	551	32	16,433	14	52.8	47.3
Inglewood	208	200	3	2,953	0	62.8	55.7
Lawndale	5	3			3	9.2	11.0
Long Beach	1,210	1,215	28	3,417	44	36.6	34.4
Los Angeles-Salt Lake	111	101			10	4.7	5.1
Montebello	340	331	37	12,827	6	79.7	48.3
Playa Del Rey	160	146			18	28.1	24.4
Potrero	16	20	6	1,719	2	81.3	106.7
Richfield	304	297	7	587	7	28.4	25.4
Rosecrans	138	171	36	18,789	3	72.5	72.5
Santa Fe Springs	565	582			15	46.1	43.0
Seal Beach	118	120	4	2,804	20	59.0	55.3
Torrance	699	632	3	265	83	18.8	15.0
Whittier	144	38	1	55	1	7.0	5.6
Wilmington	759	910	154	83,366	2	106.9	88.8

TABLE D—Continued

Wells Operated, by Fields, 1940—Continued

Field	Wells producing Dec., 1939	Wells producing Dec., 1940	Wells completed during year	Daily initial output	Wells abandoned during year	Bbls. per well produced per day Dec., 1939	Bbls. per well produced per day Dec., 1940
Group No. 4—Gas Fields:							
Buena Vista Lake	4	3	1	Gas			
Buttonwillow	20	23			4		
Chowchilla							
Delano	9	21	10	Gas	2		
Dudley Ridge							
Fairfield Knolls							
Goleta							
Marysville Buttes	3	3					
McDonald Island	5	5					
Rio Vista	22	23	4	Gas	1		
Semi-Tropic	2	2					
Tracy	5	4			1		
Miscellaneous drilling					82		
Totals	14,668	15,013	874	765,299	486	41.8	40.1

Specific Gravity of Oils Produced.

The proportion of heavy and light oil produced in the various fields is shown in Table E, on page 26, for which we are indebted to the Standard Oil Company. Specific gravities in California range from 8° Baumé in the Casmalia field, Santa Barbara County, to 60° in Kettleman Hills, Kings County.

California crude oils are all essentially of asphalt base, with a few notable exceptions. In the following localities are wells yielding crudes containing both asphalt and paraffine constituents: Oil City field, Coalinga; a few deep wells in East Side field, Coalinga; a considerable part of the Ventura County field; Western Minerals area, south of Maricopa; Wheeler Ridge, Kern County.

Oil in "Storage."

Field, refinery, pipe-line and tank-farm stocks of crude and refined products in the Pacific Coast[1] territory totaled 145,566,524 barrels December 31, 1940, as compared with 151,935,248 barrels on December 31, 1939. The total decrease in stock over the preceding year was 6,368,724 barrels.

	Dec. 31, 1939 (barrels)	Dec. 31, 1940 (barrels)
1. Gasoline-bearing crude	35,136,501	35,914,258
2. Non-gasoline-bearing crude	13,303,091	11,872,989
3. Unblended natural gasoline	1,516,033	2,485,779
4. Gasoline (not including distributing and service stations)	16,128,052	14,864,355
5. Naphtha distillates	[a]1,282,484	[a]1,889,913
6. Gas oil and Diesel oil	9,671,299	10,160,780
7. Fuel oil residuum	66,886,434	59,920,167
8. All other stocks	[b]8,011,354	[b]8,458,283
Totals	151,935,248	145,566,524
[a] Estimated amount of unfinished gasoline contained in item No. 5	1,032,536	1,711,171
[b] Coke included in item No. 8	976,545	914,273

[1] American Petroleum Institute: Summary of California Oilfield Operations for December, 1940.

TABLE E

Production of Light and Heavy Oils, by Fields, for 1940

Field	Under 20° (barrels)	20° and above (barrels)	Total (barrels)
San Joaquin Valley—			
Arvin		653,142	653,142
Belridge—North	3,005	3,891,312	3,894,317
Belridge—South	421,171	330,387	751,558
Canal		2,151,175	2,151,175
Canfield Ranch		14,260	14,260
Coalinga	1,975,258	1,798,645	3,773,903
Coalinga Eocene		6,132,925	6,132,925
Cole's Levee & Richfield Western		2,586,107	2,586,107
Devils Den	4,059		4,059
Edison	479,485	433,377	912,862
Elk Hills	917,964	3,508,937	4,426,901
Fruitvale	1,403,901	630,398	2,034,299
Grapevine		14,479	14,479
Greeley		1,470,093	1,470,093
Kern River	3,682,447		3,682,447
Kettleman Hills (North Dome)		16,716,161	16,716,161
Kettleman Hills (Middle Dome)			
Lost Hills	859,341	541,604	1,400,945
McKittrick	1,324,054	5,419	1,329,473
Midway-Sunset	7,501,163	10,885,002	18,386,165
Mountain View	24,792	2,351,076	2,375,868
Mount Poso	3,374,143		3,374,143
Paloma		129,135	129,135
Poso Creek	464,710		464,710
Rio Bravo		3,287,612	3,287,612
Round Mountain	2,531,793	117,645	2,649,438
Strand		414,254	414,254
Ten Sections		3,517,640	3,517,640
Wasco		564,988	564,988
Wheeler Ridge		112,883	112,883
Coastal—			
Arroyo Grande	13,817	7,753	21,570
Capitan		648,046	648,046
Elwood		1,271,402	1,271,402
Lompoc	81,686	17,885	99,571
Newhall	5,003	1,204,511	1,209,514
Rincon		1,581,783	1,581,783
San Miguelito		1,189,629	1,189,629
Santa Barbara Mesa	84,145		84,145
Santa Maria	7,369,678	804,014	8,173,692
Summerland	8,499		8,499
Ventura Avenue		12,565,027	12,565,027
Ventura County	59,761	1,594,389	1,654,150
Watsonville	10,980		10,980
Southern California—			
Brea Olinda	317,553	1,752,538	2,070,091
Coyote (East)	38,886	1,342,944	1,381,830
Coyote (West)		2,667,014	2,667,014
Dominguez		7,665,106	7,665,106
El Segundo	90,565	692,832	783,397
Huntington Beach	630,772	8,954,249	9,585,021
Inglewood	421,251	3,944,422	4,365,673
Lawndale		14,738	14,738
Long Beach	64,032	15,830,675	15,894,707
Los Angeles	71,182		71,182
Montebello	12,409	7,221,890	7,234,299
Playa Del Rey	71,848	1,419,750	1,491,598
Potrero		680,521	680,521
Richfield	669,144	2,550,899	3,220,043
Rosecrans		4,254,111	4,254,111
Salt Lake	121,312		121,312
Santa Fe Springs		9,430,952	9,430,952
Seal Beach		2,551,716	2,551,716
Torrance	1,398,924	2,588,725	3,987,649
Whittier	124,532	58,201	182,733
Wilmington	8,679,980	21,502,506	30,182,486
Miscellaneous		620	620
Grand totals	45,313,245	178,267,504	223,580,749

Utilization of California Crude Oil.

Most of the crude oil produced in California is sent to storage reservoirs at tank farms near the oil fields and from these reservoirs by pipelines to the refineries, the larger ones of which are located in the vicinity of Los Angeles and on San Francisco Bay.

During 1940 the crude oil consumed in California according to the U. S. Bureau of Mines [1] was 196,345,000 barrels sent to the stills at the refineries; 19,165 barrels for shipments out of the state; and 6,889,000 barrels were either consumed as fuel or added to residium; also stocks were depleted by 1,027,000 barrels.

The production of petroleum products during 1939 and 1940 is shown in Table F:

TABLE F

Commodity	1939 Amount in barrels	1940 Amount in barrels
Crude petroleum to stills	192,804,000	196,345,000
Natural gasoline, including liquid petroleum gas	14,443,000	13,953,000
Gasoline and naphtha distillates	80,096,000	77,953,000
Kerosene	3,788,000	3,866,000
Lubricating oils and greases	3,295,000	3,978,000
Gas oil and diesel oil	27,918,000	29,477,000
Residuum and non-gasoline-bearing crude [a]	77,934,000	79,698,000
Asphalt and road oil	6,216,000	6,659,000
Totals [b]	207,248,000	210,298,000
[a] Includes heavy non-gasoline crude	8,881,000	6,889,000

[b] Totals of crude oil and natural gasoline.

Operating Data.

The following tabulation (Table G) is compiled from data published by the State Division of Oil and Gas,[2] semiannually, and here combined to show the entire year's operations for all fields. The districts are the geographical subdivisions as administered by that Division and which are outlined on the accompanying map.

It will be noted that the state average yield of oil per-well-per-day was 50.6 barrels for the first six months of 1940 and 50.8 barrels for the second. This is somewhat higher than the figures 40.1 barrels average for December derived from American Petroleum Institute data as shown in Table D, on a previous page, due in part at least, to the fact that the latter is on a full-time basis, whereas the Division's figures allow for shut-down time.

[1] Knudsen, E. T., The petroleum situation in the Pacific Coast territory (monthly) 1940, U. S. Bureau of Mines.

[2] Summary of Operations—California Oil Fields: Division of Oil and Gas, Fifteenth Annual Report of State Oil and Gas Supervisor, Vol. 36, No. 1, July, Aug., Sept., 1940, and No. 3, Jan., Feb., March, 1941.

TABLE G

Production Statistics and Operating Data of California Oil Fields—1940

Field	January 1 to June 30						July 1 to December 31					
	Average number of producing wells—actual	Oil (bbls.)	Number of days producing	Production per well per day (bbls.)		Percentage of time wells produced	Average number of producing wells—actual	Oil (bbls.)	Number of days producing	Production per well per day (bbls.)		Percentage of time wells produced
				Oil	Water					Oil	Water	
Dist. 1—Aliso Canyon	6	184,909	551	98.8	1.2	50.5	8	342,873	933	98.5	1.5	63.4
Beverly Hills	3	19,415	519	29.8	70.2	95.1	3	19,576	528	30.6	69.4	95.7
Brea-Olinda	341	1,052,937	55,098	49.6	50.4	88.8	339	1,049,318	56,435	49.4	50.6	90.5
Coyote Hills	158	1,888,278	24,943	62.0	38.0	86.7	178	2,265,139	28,617	61.6	38.4	87.4
Del Valle							1	30,691	76	99.9	0.1	41.3
Dominguez	183	3,700,152	29,035	69.6	30.4	87.2	197	3,962,574	31,626	70.3	29.7	87.2
El Segundo	44	438,215	7,765	42.0	58.0	97.0	41	342,124	7,193	37.3	62.7	95.3
Huntington Beach	556	4,825,496	92,653	52.3	47.7	91.6	574	4,670,279	94,944	51.6	48.4	89.9
Inglewood	210	2,272,170	29,331	54.4	45.6	76.7	196	2,092,850	26,976	53.7	46.3	74.8
Lawndale	5	8,389	886	16.6	83.4	97.4	4	7,594	704	16.8	83.2	95.7
Long Beach	1,242	8,019,457	213,507	32.3	67.7	94.5	1,252	7,730,076	219,097	31.0	69.0	95.1
Los Angeles City	74	30,594	13,307	34.2	65.8	98.8	88	35,596	15,715	44.8	55.2	97.0
Montebello	347	4,044,076	58,148	54.5	45.5	92.1	339	3,114,205	58,581	47.6	52.4	93.9
Newhall	65	306,971	10,384	90.5	9.5	87.8	20	14,768	3,138	46.2	53.8	85.3
Newhall-Potrero							12	348,500	2,129	99.3	0.7	96.4
Playa Del Rey	168	752,107	29,095	27.9	72.1	95.2	159	706,110	28,003	27.2	72.8	95.7
Potrero	18	310,895	3,112	63.3	36.7	95.0	20	366,570	3,380	70.0	30.0	91.8
Richfield	301	1,555,524	50,061	65.1	34.9	91.4	304	1,459,204	51,646	63.8	36.2	92.3
Rosecrans	150	1,892,656	26,080	71.2	28.8	95.5	168	2,356,663	29,248	74.9	25.1	94.6
Salt Lake	8	43,059	1,417	21.1	78.9	97.3	8	42,675	1,409	20.5	79.5	95.7
Santa Fe Springs	581	4,730,716	98,172	31.2	68.8	92.8	591	4,712,091	103,032	30.2	69.8	94.7
Seal Beach	117	1,317,307	17,289	25.1	74.9	81.2	114	1,235,919	17,526	24.6	75.4	83.6
Torrance	687	2,149,996	120,089	71.6	28.4	96.0	656	1,812,671	113,849	68.2	31.8	94.3
Whittier	138	147,211	20,822	26.7	73.3	82.9	42	35,380	7,179	37.4	62.6	92.9
Wilmington	788	15,137,295	136,032	98.1	1.9	94.9	880	15,100,455	154,570	97.0	3.0	95.5
Los Angeles County	2	2,765	338	39.5	60.5	92.9	4	10,541	681	61.0	39.0	92.5
San Bernardino County	1	341	76	98.8	1.2	41.8						
Totals	6,193	54,830,931	1,038,710	51.8	48.2	92.2	6,198	53,864,442	1,057,215	51.1	48.9	92.7
Dist. 2—Bardsdale	140	248,971	20,628	82.0	18.0	81.0	143	232,872	24,813	79.7	20.3	94.3
Ojai	59	24,708	9,210	47.6	52.4	85.8	54	23,594	8,264	50.7	49.3	83.2
Piru	95	171,180	15,546	45.7	54.3	89.9	99	179,247	16,730	42.3	57.7	91.8
Rincon	90	1,276,827	14,298	80.3	19.7	87.3	101	1,490,852	16,684	81.6	18.4	89.8
Santa Paula	47	13,283	6,258	34.4	65.6	73.2	48	13,158	6,164	34.9	65.1	69.8
Sespe	22	51,451	2,918	64.7	35.3	72.9	19	47,243	2,693	75.1	24.9	77.0

Simi	52	15,769	8,412	49.7	50.3	88.9	52	15,882	8,328	44.0	56.0	87.0
South Mountain	88	295,036	13,831	96.3	3.7	86.4	90	282,701	15,021	95.6	4.4	90.7
Ventura	325	6,335,362	52,531	83.3	16.7	88.8	341	6,223,916	56,686	82.7	17.3	90.3
Ventura County	2	56,583	364	100.0	0	100.0	2	39,835	366	99.9	0.1	99.5
Totals	920	8,489,170	143,996	81.3	18.7	86.0	949	8,549,300	155,749	80.8	19.2	89.2
DIST. 3—Arroyo Grande	16	15,092	2,031	84.2	15.8	69.7	15	15,514	1,774	86.2	13.8	64.3
Capitan	43	343,634	7,065	69.4	30.6	90.3	43	307,281	6,349	67.9	32.1	80.2
Casmalia	4	39,250	469	82.2	17.8	64.4	8	79,519	958	85.2	14.8	65.1
Cat Canyon	13	322,647	1,660	93.8	6.2	70.2	20	841,091	2,532	96.7	3.3	68.8
Elwood	67	680,526	10,864	24.5	75.5	89.1	64	606,424	10,961	21.6	78.4	93.1
Half Moon Bay	2	876	364	100.0	0	100.0	2	715	366	100.0	0	99.5
La Goleta Gas	[2]0	0	0	0	0	0	[2]0	0	0	0	0	0
Lompoc	7	48,464	879	33.6	66.4	69.0	7	53,461	1,039	30.4	69.6	80.7
Mesa	24	45,731	4,176	8.7	91.3	95.6	22	38,971	3,724	9.0	91.0	92.0
Moody Gulch	1	421	69	90.0	10.0	37.9	1	125	15	92.6	7.4	8.2
Santa Maria	124	410,288	18,836	46.2	53.8	83.5	128	398,554	18,726	45.5	54.5	79.5
Santa Maria Valley	102	2,592,461	11,828	96.9	3.1	63.7	135	3,453,452	17,689	91.3	8.7	71.2
Sargent	8	4,079	904	100.0	0	62.1	8	3,969	1,072	100.0	0	72.8
Summerland	6	4,688	1,081	26.1	73.9	99.0	5	3,758	852	29.4	70.6	92.6
Totals	417	4,508,157	60,226	56.8	43.2	79.4	458	5,802,834	66,057	60.9	39.1	78.4
DIST. 4—Belridge	271	2,375,466	43,303	76.7	23.3	87.8	283	2,250,683	46,812	69.6	30.4	89.9
Buttonwillow Gas	[2]12	0	0	0	0	0	[2]15	0	0	0	0	0
Canal	34	1,054,351	5,514	95.9	4.1	89.1	28	979,444	4,691	95.5	4.5	91.1
Canfield Ranch	1	8,955	171	99.3	0.7	94.0	1	6,809	174	100.0	0	94.6
Coles Levee	27	859,744	3,682	97.9	2.1	74.9	56	1,726,225	8,219	98.3	1.7	79.8
Devils Den	2	2,290	298	41.4	58.6	81.9	3	5,494	399	61.7	38.3	72.3
Edison	93	439,162	12,714	67.7	32.3	75.1	97	500,551	14,047	67.4	32.6	78.7
Elk Hills	194	2,197,178	31,879	40.2	59.8	90.3	193	2,227,921	33,457	40.6	59.4	94.2
Elk Hills	[2]0	0	0	0	0	0	[2]0	0	0	0	0	0
Fruitvale	161	1,057,995	23,280	61.9	38.1	79.4	160	1,003,014	23,970	60.3	39.7	81.4
Greeley	26	636,623	3,936	68.2	31.8	83.2	36	829,351	5,040	73.8	26.2	76.1
Kern River	1,657	1,942,587	272,817	14.2	85.8	90.5	1,657	1,833,607	284,937	13.4	86.6	93.5
Lost Hills	341	729,861	54,258	23.7	76.3	87.4	274	648,014	46,894	23.9	76.1	93.0
McKittrick-Temblor	212	645,759	35,157	16.8	83.2	91.1	200	659,525	33,841	19.1	80.9	92.0
Midway-Sunset	2,637	9,488,883	415,354	43.7	56.3	86.5	2,501	8,946,154	395,192	43.4	56.6	85.9
Midway-Sunset	[2]21	0	0	0	0	0	[2]20	0	0	0	0	0
Mt. Poso	273	1,759,479	33,615	21.8	78.2	67.7	282	1,652,039	34,889	21.1	78.9	67.2
Mountain View	185	1,634,235	29,524	69.7	30.3	87.7	180	1,363,846	29,514	64.6	35.4	89.1
Paloma	1	37,978	202	99.8	0.2	100.0	4	91,341	549	98.9	1.1	74.6
Paloma	[2]3	0	0	0	0	0	[2]2	0	0	0	0	0
Poso Creek	59	196,594	8,559	28.0	72.0	79.7	50	182,213	8,088	26.3	73.7	87.9
Rio Bravo	46	1,426,905	7,867	98.0	2.0	94.0	64	1,809,983	10,349	97.3	2.7	87.9
Round Mountain	198	1,352,577	28,418	20.2	79.8	78.9	205	1,354,787	29,636	20.4	79.6	78.6
Semitropic Gas	[2]9	0	0	0	0	0	[2]5	0	0	0	0	0
Strand	8	257,812	1,332	96.4	3.6	91.5	9	272,345	1,454	93.4	6.6	87.8
Ten Section	46	1,607,669	7,955	97.5	2.5	95.0	65	1,911,834	10,679	96.9	3.1	89.3
Trico Gas	[2]7	0	0	0	0	0	[2]11	0	0	0	0	0
Wasco	10	256,278	1,402	96.0	4.0	77.0	12	309,724	1,859	98.1	1.9	84.2

TABLE G—Continued

Production Statistics and Operating Data of California Oil Fields—1940

Field	January 1 to June 30						July 1 to December 31					
	Average number of producing wells—actual	Oil (bbls.)	Number of days producing	Production per well per day (bbls.)		Percentage of time wells produced	Average number of producing wells—actual	Oil (bbls.)	Number of days producing	Production per well per day (bbls.)		Percentage of time wells produced
				Oil	Water					Oil	Water	
DIST. 4—Continued												
Wheeler Ridge	34	56,689	5,753	80.3	19.7	93.0	34	56,133	6,057	80.3	19.7	96.8
Kern County	3	9,383	377	48.6	51.4	69.0	2	4,675	256	43.4	56.6	69.6
Tulare County	0	0	0	0	0	0	0	0	0	0	0	0
Totals	6,519	30,034,453	1,027,367	38.6	61.4	86.6	6,396	30,625,712	1,031,003	39.6	60.4	87.6
DIST. 5—Coalinga	823	1,857,022	128,305	45.0	55.0	85.7	785	1,923,078	127,399	45.5	54.5	88.2
East Coalinga Extension	82	2,554,070	8,569	99.5	0.5	57.4	128	3,562,748	14,697	99.1	0.9	62.4
Kettleman Middle Dome	0	0	0	0	0	0	0	0	0	0	0	0
Kettleman North Dome	261	8,696,735	39,751	82.1	17.9	83.7	266	7,993,970	41,436	78.8	21.2	84.7
McDonald Island Gas	[3]5	0	0	0	0	0	[3]6	0	0	0	0	0
Rio Vista Gas	[2]19	0	0	0	0	0	[2]18	0	0	0	0	0
Tracy Gas	[2]4	0	0	0	0	0	[3]3	0	0	0	0	0
Fresno County—Cantua Creek Area							1	1,795	126	23.2	76.8	68.5
Glenn County—Willows Area	[2]0	0	0	0	0	0	[2]0	0	0	0	0	0
Humboldt County—Eureka Area	[2]1	0	0	0	0	0	[2]1	0	0	0	0	0
Kings County—Pyramid Hills Area	1	359	28	88.6	11.4	15.4	1	29	4	87.9	12.1	2.2
Madera County—Chowchilla Area	[2]0	0	0	0	0	0	[2]0	0	0	0	0	0
Solano County—Potrero Hills Area	[2]0	0	0	0	0	0	[2]0	0	0	0	0	0
Sutter County—Marysville Buttes Area	[2]2	0	0	0	0	0	[2]3	0	0	0	0	0
Yolo County—Fairfield Knolls Area	[2]0	0	0	0	0	0	[2]0	0	0	0	0	0
Totals	1,167	13,108,186	176,653	75.8	24.2	83.2	1,181	13,481,620	183.662	75.0	25.0	84.5
Grand totals	15,216	110,970,897	2,446,952	50.6	49.4	88.4	15,182	112,323,908	2,493,686	50.8	49.2	89.3

[2] Gas wells omitted from totals.
[3] Estimated.

Proved Oil Land.

The total proved oil and natural gas land of California as of January 1, 1941 is 186,976 acres; an increase of 12,894 acres during the year 1940, according to data furnished by the Division of Oil and Gas. The acreage as of January 1, 1941 was distributed by counties as follows:

TABLE H

Proved Oil and Natural Gas Land January 1, 1941

County	*Acres*
Fresno	21,987
Imperial	130
Kern	91,932
Kings	8,144
Los Angeles	17,205
Orange	6,359
Sacramento	33,510
San Bernardino	10
San Joaquin	1,370
San Luis Obispo	390
Santa Barbara	17,036
Santa Clara	80
Solano	7,190
Tulare	4,320
Ventura	7,313
Total	186,976

CHAPTER THREE

METALS

Bibliography: Reports of State Mineralogist I-XXXVII (inc.). Bulletins 5, 6, 18, 23, 27, 36, 50, 57, 76, 78, 85, 92, 95, 108. Spurr and Wormser, "Marketing of Metals and Minerals." See also under each metal.

The value of metals produced in California during 1940 amounted to $59,949,838, compared with $55,375,873 in 1939. Chief among these is as to value and always has been, gold followed in turn by quicksilver, tungsten ore, silver, copper, lead, molybdenum ore, platinum metals, chromite, zinc, antimony, iron ore, manganese ore, and titanium.

A comparison of the 1939 output with that of 1940 is afforded by the following table:

Substance	1939		1940		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Antimony	150 tons	$4,552	56,854 lbs.	7,958	3,406+
Chromite	3,936 tons	52,673	2,599 tons	32,796	19,877—
Copper	8,390,215 lbs.	872,582	12,833,363 lbs.	1,450,170	577,588+
Gold	1,435,264 fine oz.	50,234,240	1,455,670 fine oz.	50,948,485	714,245+
Iron ore	16,990 tons	77,788	*	*	—
Lead	1,061,294 lbs.	49,880	3,092,636 lbs.	154,632	76,844+
Manganese	*	*	314 tons	3,260	+
Platinum metals	896 fine oz.	32,135	1,358 fine oz.	62,419	30,284+
Quicksilver	11,201 flasks	1,102,563	18,907 flasks	3,209,754	2,107,191+
Silver	2,599,139 fine oz.	1,764,264	2,359,776 fine oz.	1,678,063	86,201—
Tungsten	74,110 units	1,153,735	107,022 units	2,267,135	1,113,400+
Zinc	16,390 lbs.	852	183,088 lbs.	11,472	10,620+
Unapportioned		[a]30,609		[b]123,694	93,085+
Total value		$55,375,873		$59,949,838	
Net increase					$4,573,965

* Included under "unapportioned."
[a] Includes manganese, molybdenum and titanium.
[b] Includes iron ore, molybdenum and titanium.

ALUMINUM

Bibliography: Report XVIII, p. 198, XXXIV. Bulletins 38, 67. U. S. Geol. Surv., Min. Res. of U. S.

To date there has been no commercial production of aluminum ore in California. Only a single authenticated occurrence of bauxite has thus far been noted in this state, being in Riverside County southeast of Corona, but as yet undeveloped.

Minerals containing aluminum are abundant, the most widely distributed being the clays. There are only two, however, thus far of consequence commercially, in the production of the metal: bauxite (to which may be added the related hydrated oxides, hydrargillite and diaspore) and cryolite. Cryolite is found in commercial quantities only in south Greenland, and was formerly the only ore of aluminum used, being still employed as a flux in the extraction of the metal. Bauxite has been for some years the most important source of aluminum and its salts. Its color varies from gray to red, according to the amount of iron

present, the composition ranging usually between the following limits: Al_2O_3, 30%–60%; Fe_2O_3, 3%–25%; SiO_2, 0.5%–20%; TiO_2, 0.0–10%. Besides its reduction to the metal bauxite is also utilized in the manufacture of aluminum salts, refractories, alundum (fused alumina) for use as an abrasive, and in the refining of oil.

ANTIMONY

Bibliography: State Mineralogist Reports VIII, X, XII-XV (inc.), XVII, XXII, XXIII, XXV-XXVII (inc.), XXXI, XXXIV, XXXVI. Bulletins 38, 91.

During 1940 there were shipments of antimony ore in California, coming from properties in Inyo, Kern, and San Bernardino counties, amounting to 56,845 pounds of recoverable metal valued at $7,958. The 1939 production was 150 tons of antimony ore worth $4,552.

Pure antimony metal and manufactured antimony compounds are of considerable importance as pigments in the ceramic industry. The most important use of the metal, commercially, is in various alloys, particularly type-metal (with tin and lead), babbitt (with tin and copper), and britannia metal (with tin and copper). An alloy of 6% antimony and 94% lead is being extensively used in making battery plates for storage batteries for automobiles, airplanes and radio apparatus.

Present New York quotations (July 17, 1941) are around 16¢ per pound for Chinese (duty paid) and 14¢ for domestic antimony.

Antimony Production in California, by Years.

The production of antimony ore in California by years since 1887 has been as follows:

Year	Tons	Value	Year	Tons	Value
1887	75	$15,500	1915	510	$35,666
1888	100	20,000	1916	1,015	64,793
1889			1917	158	18,786
1893	50	2,250	1918		
1894	150	6,000	1925	[a]26	770
1895	33	1,485	1926		
1896	17	2,320	1927	20	590
1897	20	3,500	1928	20	761
1898	40	1,200	1929		
1899	75	13,500	1939	150	4,552
1900	70	5,700	1940	[b]28	7,958
1901	50	8,350			
1902			Totals	2,607	$213,690

[a] Annual details concealed under 'Unapportioned.'
[b] Beginning 1940, amount of recoverable metal; before, tons of antimony ore shipped.

ARSENIC

Bibliography: Reports XVIII, XXIII, XXV, XXX, XXXIII, XXXV. Bulletin 67. U. S. G. S., Min. Res. of U. S.

Arsenic is found in a number of localities in California in the mineral arsenopyrite (FeAsS), which is frequently gold bearing; and in scorodite ($FeAsO_4+2H_2O$), an oxidation product of arsenopyrite. The occurrence of realgar (AsS) has also been noted.

Except for a small output in 1924, there has been no commercial recovery of arsenic from California ores. There having been only a single operator, the figures are concealed under the 'Unapportioned' item.

BERYLLIUM

Bibliography: State Mineralogist Report XXVII, XXXV, XXXVI. Eng. & Min. Jour.-Press, Vol. 118, No. 8, p. 285, Aug. 23, 1924. U. S. Bureau of Mines Information Circular 6190.

Beryllium is a metal resembling aluminum closely in its chemical character. It has a specific gravity of 1.85, is almost as hard as quartz (will scratch glass) and will take a high polish. The use of beryllium as a metal is still more or less in the experimental stage because the cost of extracting the metal from its ores almost makes it prohibitive and the present sources of supply of the ore are limited. Not until such a time when deposits can be found that will assure a definite supply and metallurgical costs are such as to justify its use, will the metal be found in common use.

There are a number of berryllium minerals, but none have been found in commercial quantities, except beryl, which is a beryllium-aluminum silicate. The chief use at present for ground beryl is as an addition to porcelain products, where it reduces the coefficient of expansion. Beryllium metal is difficult to separate from aluminum.

Present (July 17, 1941) quotations for beryllium ore are per ton in carload lots, minimum 10 per cent BeO, $30; minimum 12 per cent BeO, $35, f.o.b. mine.

Beryl occurs in California in the pegmatite dikes of the tourmaline gem district in northern San Diego and northwestern Riverside counties; and an occurrence has recently been noted in western Inyo County, but the quantity is as yet unproved. Thus far there have been no commercial shipments of beryl from California except for gem purposes (the pink and aquamarine varieties).

BISMUTH

Bibliography: State Mineralogist Report XXXV. Bulletins 38, 67, 91. Am. Jour. Sci., 1903, Vol. 16.

Several bismuth minerals have been found in California, notably native bismuth and bismite (the ochre) in the tourmaline gem district in San Diego and Riverside counties near Pala. Other occurrences of bismuth minerals, including the sulphide, bismuthinite, have been noted in Inyo, Fresno, Nevada, Tuolumne, San Bernardino, and Mono counties, but only in small quantities. The only commercial production recorded was 20 tons valued at $2,400 in 1904, and credited to Riverside County.

The uses of bismuth are somewhat restricted, being employed principally in the preparation of medicinal salts, and in low melting-point or cliché alloys. These alloys are utilized in automatic fire sprinkler systems, in electric fuses, and in solders.

The present quotation (July 17, 1941) for bismuth is $1.25 per pound, in ton lots for the refined metal.

CADMIUM

Bibliography: U. S. Geol. Surv., Min. Res. of U. S., 1908, 1918.

During 1917 and 1918, cadmium metal was recovered by the electrolytic zinc plant of the Mammoth Copper Company in Shasta County. It was shipped in the form of 'sticks' and amounted to a total of several thousand pounds for the two years, the exact figures being concealed under 'Unapportioned.' That was the first, and thus far the only, commercial production of cadmium recorded from California ore. Cadmium occurs there associated with zinc sulphide, sphalerite. Cadmium also occurs in the Cerro Gordo Mines, Inyo County, associated with smithsonite (zinc carbonate).

Cadmium is produced in the United States in two forms—metallic cadmium and the pigment, cadmium sulphide. The principal use of the metal is in low-melting point, or cliché alloys, and its salts are utilized in the arts, medicine, and in electroplating. The sulphide is employed as a paint pigment, being a strong yellow, which is unaffected by hydrogen sulphide gas from coal smoke. It is also employed in coloring glass and porcelain. Cadmium cliché metal is stated to be superior to the corresponding bismuth alloy, for making stereotype plates. Cadmium is also used in bronze telegraph and telephone wires, and gives some promise of being utilized in electroplating.

The present quotation (July 21, 1941) for cadmium is 90¢ per pound for the metal.

CHROMITE

Bibliography: State Mineralogist Reports IV, XII, XIII, XIV, XV, XVII, XVIII, XXI-XXIX (inc.), XXXI, XXXIV-XXXVII (inc.). Bulletins 38, 76, 91. Preliminary Report 3. U. S. G. S., Bull. 430. Min. & Sci. Press, Vol. 114, p. 552.

During 1940 there were shipments of chromite or chrome-iron ore in California amounting to 2,599 short tons recalculated to a basis of 45% Cr_2O_3 and valued at $32,796. The above came from properties in Calaveras, Del Norte, El Dorado, Fresno, Placer, and Stanislaus counties; also there was a small production from one property each in Placer and Plumas counties, but not shipped. The 1940 totals showed a decrease in amount and value as compared with those of 1939 which were 3,936 tons worth $52,673.

Occurrence.

Chromite is widely distributed in California, the principal production, thus far, having come from El Dorado, San Luis Obispo, Del Norte, Shasta, Siskiyou, Placer, Fresno, and Tuolumne counties. In 1918 a total of 29 counties contributed to the State's output. There are two main belts in California yielding this mineral, one along the Coast Ranges from San Luis Obispo County to the Oregon line, including the Klamath Mountains at the north end, and the other in the Sierra Nevada from Tulare County to Plumas County. Chromite occurs as lenses in basic igneous rocks such as periodotite and pyroxenite, and in serpentines which have been derived by alteration of such basic rocks.

Uses.

The major consumption of chromite ore is for use as a refractory lining in smelting furnaces for steel and copper. A smaller portion is used in the preparation of ferrochrome for chrome-steel alloys, and of chromium chemicals, the latest development of which is chrome plating as used in the automobile industry, on ships, and in oil refineries to protect metal surfaces from wear and erosion.

Imports of foreign chromite[1] to the United States duty free during 1940 amounted to 657,689 long tons worth $8,754,770, compared with 317,511 long tons valued at $3,814,944 in 1939.

Total Chromite Production of California.

Production of chromite in California began, apparently in the period 1869-1873 in Del Norte County, followed by San Luis Obispo in 1874. There was considerable activity in San Luis Obispo from 1880 to 1883, inclusive, and a total of 23,238 long tons (or 26,028 short tons) valued at $329,924 was shipped from that county up to the beginning of 1887. There are records of shipments from Sonoma County (before 1883), Placer County (1883 and 1884), and Calaveras County. Apparently the state's total in the period 1869-1883 was some 45,000 tons.[2] The tabulation herewith shows the output of chromite in California annually, including the earliest figures so far as they are available. The figures from 1887 to date are from the records of the State Mining Bureau:

Year	Tons	Value	Year	Tons	Value
1869-1883 Del Norte County, Sonoma County, Placer County, Calaveras County	19,000	$239,400			
1874-1887 (San Luis Obispo County)	26,028	329,924	1913	1,180	$12,700
1887	3,000	40,000	1914	1,517	9,434
1888	1,500	20,000	1915	3,725	38,044
1889	2,000	30,000	1916	48,943	717,244
1890	3,599	53,985	1917	52,379	1,130,298
1891	1,372	20,580	1918	73,955	3,649,497
1892	1,500	22,500	1919	*4,314	97,164
1893	3,319	49,785	1920	1,770	43,031
1894	3,680	39,980	1921	347	6,870
1895	1,740	16,795	1922	379	6,334
1896	786	7,775	1923	84	1,658
1897			1924	350	6,700
1898			1925	191	3,712
1899			1926	393	7,063
1900	140	1,400	1927	225	5,063
1901	130	1,950	1928	729	15,179
1902	315	4,725	1929	327	5,025
1903	150	2,250	1930	84	1,905
1904	123	1,845	1931	441	6,737
1905	40	600	1932 / 1933 [a]	1,206	16,587
1906	317	2,859	1934	294	3,498
1907	302	6,040	1935	488	6,111
1908	350	6,195	1936	221	3,314
1909	436	5,309	1937	1,918	20,830
1910	749	9,707	1938	982	10,864
1911	935	14,197	1939	3,936	52,673
1912	1,270	11,260	1940	2,599	32,796
			Totals	275,760	$6,849,942

* Recalculated to 45% Cr_2O_3 beginning with 1919.
[a] Included under 'Unapportioned.'

[1] U. S. Bureau of Foreign and Domestic Commerce, Monthly Summary of Foreign Commerce to the United States, Dec. 1940.
[2] Day, D. T., Mineral Res. of the U. S. 1883-1884, U. S. G. S., pp. 569, 570, 1885.

COBALT

Bibliography: Report XIV, XXXIII, XXXIV. Bulletins 67, 91. U. S. G. S., Min. Res. of U. S., 1912, 1918. U. S. B. M., I.C. 6331.

Occurrences of some of the cobalt minerals have been noted in several localities in California, but to date no commercial production has resulted. Some of the copper ores of the foothill copper belt in Mariposa and Madera counties have been found to contain cobalt up to 3%.

The nominal quotation for cobalt (July 17, 1941) is around 97 to 99% at $2.11 per pound for the refined metal.

The most important use of cobalt is in the manufacture of the alloy, stellite, in which it is combined with chromium, for making high-speed lathe tools, and non-tarnishing cutlery and surgeons' appliances. The metal is also used in electroplating, similarly to nickel; and the oxide, carbonate, chloride, sulphate and other salts are used in ceramics for coloring. Some of the organic salts of cobalt (acetate, resinate, oleate) are employed as 'driers' in paint and varnish.

COPPER

Bibliography: State Mineralogist Reports VIII-XXXVII (inc.). Bulletins 23, 50, 91.

The total output of copper in California during 1940 amounted to 12,833,363 pounds of recoverable metal valued at $1,450,170. This was an increase in amount and value as compared with the 1939 output which was 8,390,215 pounds worth $872,582. The average price of copper during 1940 was 11.3¢ per pound compared with 10.4¢ per pound in 1939; 9.8¢ in 1938; 12.1¢ in 1937; 9.2¢ in 1936; 8.3¢ in 1935; and 8.0¢ in 1934.

Copper was second to gold among the metals in California from 1896 to 1932, when it was passed in output by quicksilver and silver, and in 1933 also by tungsten, in 1936 and 1937 by silver only, and in 1938-1940 (inc.) by silver, quicksilver and tungsten.

Distribution of the 1940 output of copper in California by counties was as follows:

County	Pounds	Value
Amador	20,643	$2,333
Butte	6,349	717
Calaveras	7,561	854
El Dorado	1,630	184
Imperial	11,201	1,266
Inyo	212,037	23,960
Kern	2,617	296
Los Angeles	3,138	355
Mariposa	7,616	861
Mono	113,873	12,868
Napa	6,447	729
Nevada	39,403	4,453
Orange	1,235	140
Placer	10,578	1,195
Plumas	10,587,611	1,196,400
Riverside	22,269	2,516
San Bernardino	50,913	5,753
Santa Barbara	7,765	877
Shasta	1,714,324	193,719
Sierra	1,367	154
Tuolumne	4,649	525
Lassen, Siskiyou, Trinity*	137	15
Totals	12,833,363	$1,450,170

* Combined to conceal the output of individual producers in each.

According to preliminary data issued by the U. S. Bureau of Mines[1] the smelter production of primary copper from domestic sources during 1940 amounted to 1,818,167,516 pounds, an increase of approximately 28 percent compared with the 1939 output. The value of copper increased approximately 39 percent in 1940. The average price of copper delivered during the year, as reported to the U. S. Bureau of Mines by selling agents was 11.3¢ per pound.

Copper Production of California, by Years.

Although some mining of copper ores in a small way had been done earlier, shipments in appreciable quantities began in 1861 and continued of importance up to the end of 1867, when a total of 68,631 tons (of 2376 pounds) of high-grade ores, and 847 tons of matte or 'regulus'[2] had been shipped to smelters at New York, Boston, and Swansea, Wales. The most important district at that time was Copperopolis and vicinity in Calaveras County, with some shipments also made from Mariposa, El Dorado, Fresno and San Luis Obispo counties. From 1868 to 1882, the output was insignificant. There are wide discrepancies in the figures recorded for copper production previous to 1882, in which year the data of the U. S. Geological Survey began. The detailed statistics of the California State Mining Bureau began in the year 1894.

Amount and value of copper production in California annually since 1882 is given in the following tabulation:

Copper Production of California, by Years

Year	Pounds	Value	Year	Pounds	Value
1882	826,695	$144,672	1912	34,169,997	$5,638,049
1883	1,600,862	265,743	1913	34,471,118	5,343,023
1884	876,166	120,911	1914	30,491,535	4,055,375
1885	469,028	49,248	1915	40,968,966	7,169,567
1886	430,210	43,021	1916	55,809,019	13,729,017
1887	1,600,000	192,000	1917	48,534,611	13,249,948
1888	1,570,021	235,303	1918	47,793,046	11,805,883
1889	151,505	18,180	1919	22,162,605	4,122,246
1890	23,347	3,502	1920	12,947,299	2,382,303
1891	3,397,405	424,675	1921	12,088,053	1,559,358
1892	2,980,944	342,808	1922	22,883,987	3,090,582
1893	239,682	21,571	1923	28,346,860	4,166,989
1894	738,594	72,486	1924	52,089,349	6,823,704
1895	225,650	21,901	1925	46,968,499	6,669,527
1896	1,992,844	199,599	1926	33,521,544	4,693,014
1897	13,638,626	1,540,666	1927	27,350,316	3,582,888
1898	21,543,229	2,475,168	1928	25,162,304	3,623,360
1899	23,915,486	3,990,534	1929	33,809,258	5,941,799
1900	29,515,512	4,748,242	1930	26,534,752	3,449,522
1901	34,931,788	5,501,782	1931	12,954,842	1,178,890
1902	27,860,162	3,239,975	1932	1,417,536	89,307
1903	19,113,861	2,520,997	1933	992,515	63,521
1904	29,974,154	3,969,995	1934	590,638	47,252
1905	16,997,489	2,650,605	1935	2,031,836	168,645
1906	28,726,448	5,522,712	1936	9,991,799	919,245
1907	32,602,945	6,341,387	1937	10,512,500	1,272,013
1908	40,868,772	5,350,777	1938	1,613,491	158,122
1909	65,727,736	8,478,142	1939	8,390,215	872,582
1910	53,721,032	6,680,641	1940	12,833,363	1,450,170
1911	36,838,024	4,604,753			
			Totals	1,190,429,070	$187,087,817

[1] U. S. Bureau of Mines Mineral Market Report M. M. S. 916, May 13, 1941.

[2] Browne, J. Ross, Mineral Resources West of the Rocky Mountains, p. 168, 1867.

GOLD

Bibliography: State Mineralogist Reports I to XXXVII (inc.), (except III and VIII). Bulletins 36, 45, 57, 91, 92, 95, 108. U. S. Geol. Surv., Prof. Paper 73. U. S. Bur. of Mines, Econ. Paper 3 (1929).

Gold was first, and, for many years, the most important single mineral product of California. Although now surpassed for a number of years in annual value by petroleum, and by natural gas from 1923 to 1932, it still heads our metal list, and California continues to outrank all the other gold-producing States of the United States, including Alaska. In fact, at present, California is producing approximately 30% of the gold mined in the entire United States.

There has been a steady increase in the development of both lode and placer mines in California during the last ten years, brought about by the present economic conditions. During 1940 there were 1866 operators in California, not including snipers, prospectors and various individuals, selling gold in small lots to the bullion dealers.

The production of gold in California during 1940 totaled 1,455,671 fine ounces valued at $50,948,485, being an increase of 20,407 fine ounces over the 1939 yield, which was 1,435,264 fine ounces worth $50,234,240. Deep or lode mines accounted for 750,719 fine ounces worth $26,275,265; and placers (mainly bucket line, dragline, and power shovel dredges) produced 704,952 fine ounces worth $24,673,320.

The 1940 output was the largest in value since 1856 and in amount since 1862. The 1939 lode output of gold was undoubtedly the largest in the history of the State.

As the Division of Mines has never independently gathered the statistics of gold and silver production, these figures, as in former years, are published by cooperation with and through the courtesy of Charles White Merrill and H. M. Gaylord of the Division of Mineral Statistics, U. S. Bureau of Mines.

Photo by Walter W. Bradley

Cyanide plant of Yellow Aster Gold Mine, Randsburg, Kern County, California.

Distribution for the 1940 gold output by counties was as follows:

County	Mines producing[1]		Total	
	Lode	Placer	Fine ounces	Value
Alpine	1		430	$15,050
Amador	28	46	117,776	4,122,160
Butte	19	41	72,681	2,543,835
Calaveras	41	73	86,754	3,036,390
Colusa	1		1	35
Del Norte		5	50	1,750
El Dorado	58	43	38,331	1,341,585
Fresno	2	9	984	34,440
Humboldt	1	10	591	20,685
Imperial	13	6	7,219	252,665
Inyo	100	8	11,873	415,555
Kern	134	23	82,493	2,887,255
Lassen	5		77	2,695
Los Angeles	22	4	7,384	258,440
Madera	16	22	1,400	49,000
Mariposa	70	26	27,134	949,690
Mendocino		1	2	70
Merced		8	51,907	1,816,745
Modoc	3		7	245
Mono	35	1	12,214	427,490
Monterey and Napa[2]	3		1,039	36,365
Nevada	36	50	313,269	10,964,415
Orange	1	2	43	1,505
Placer	36	75	51,806	1,813,210
Plumas	29	42	37,202	1,302,070
Riverside	41	3	2,376	83,160
Sacramento	1	18	158,237	5,538,295
San Bernardino	126	12	14,726	515,410
San Diego	15		485	16,975
San Francisco		[3]	70	2,450
San Joaquin		5	9,405	329,175
San Luis Obispo		2	10	350
Santa Barbara	1		1	35
Santa Cruz	2	[3]	19	665
Shasta	31	41	42,261	1,479,135
Sierra	20	42	27,391	958,685
Siskiyou	45	94	59,109	2,068,815
Stanislaus		11	36,464	1,276,240
Trinity	28	70	49,433	1,730,155
Tulare	2		16	560
Tuolumne	54	20	21,932	767,620
Ventura	3		44	1,540
Yuba	7	23	111,025	3,885,875
Totals	1,030	836	1,455,671	$50,948,485

[1] Excludes itinerant prospectors, snipers, high-graders, and others who gave no evidence of legal right to property.
[2] Combined to avoid disclosure of individual output.
[3] Output from property not classed as a "mine."

The largest production of gold by counties was reported by Nevada County with an output of 313,269 fine ounces ($10,964,415); followed by Sacramento County second with 158,237 fine ounces ($5,538,295); Amador County third with 117,776 fine ounces ($4,122,160); Yuba County fourth with 111,025 fine ounces ($3,885,875); Calaveras County fifth with 86,754 fine ounces ($3,036,390); Kern County sixth with 82,493 fine ounces ($2,887,255); followed in turn by Butte, Siskiyou, Merced, Placer, Trinity, Shasta, El Dorado, Plumas, and Stanislaus counties, all with total gold yields having a value in excess of a million dollars.

The gold from Nevada, Amador and Kern counties is mainly from the lode or deep mines; while that from Sacramento and Yuba counties is almost entirely from dredges and that from Calaveras County is about equally divided between lode mines and dredges.

The following is quoted from the advance statement of gold in 1940 by courtesy of the U. S. Bureau of Mines,* Department of Commerce:

"*Gold.* Since 1929, when the value of the California gold output reached a low of $8,526,703, the value of production has expanded sixfold, although the gain in 1940 over 1939 was the smallest in a decade. In quantity, the 1940 output of gold was greater than in any year since 1862, and in value it was greater than in any year since 1856; the lode output was less in 1940 than in 1939. Placer gold output in 1940 rose to a point where it nearly equaled lode output, and its total value was the highest since 1862.

"The 25 leading gold-producing mines in California in 1940, listed in the following table, yielded 55 percent of the total gold output of the State in that year. Four lode mines (all gold ore) and one placer (connected-bucket dredge) in the 1939 list were displaced in 1940 by two lode mines (both gold ore) and three placers (two connected-bucket dredge and one dragline dredge). A dragline dredge operation ranked in 1940 for the first time among the 25 leading gold producers in the State."

Twenty-five leading gold-producing mines in California in 1940, in order of output

Rank	Mine	District	County	Rank in 1939	Operator	Source of gold
1	Idaho-Maryland-Brunswick	Grass Valley-Nevada City	Nevada	1	Idaho Maryland Mines Corp.	Gold ore
2	Empire Star mines	Grass Valley-Nevada City	Nevada	2	Empire Star Mines Co., Ltd.	Gold ore
3	Natomas Co.	Folsom	Sacramento	3	Natomas Co.	Dredge
4	Yuba Unit	Yuba River	Yuba	4	Yuba Cons. Gold Fields	Dredge
5	Lava Cap	Grass Valley-Nevada City	Nevada	6	Lava Cap Gold Mining Corp.	Gold ore
6	Butte Unit	Oroville	Butte	11	Yuba Cons. Gold Fields	Dredge
7	Central Eureka and Old Eureka	Mother Lode	Amador	5	Central Eureka Mining Co.	Gold ore
8	Capital dredges	Folsom	Sacramento	7	Capital Dredging Co.	Dredge
9	Carson Hill	Mother Lode	Calaveras	8	Carson Hill Gold Mining Corp.	Gold ore
10	Sheepranch	East Belt	Calaveras	18	St. Joseph Lead Co.	Gold ore
11	Argonaut	Mother Lode	Amador	10	Argonaut Mining Co.	Gold ore
12	Golden Queen	Mojave	Kern	9	Golden Queen Mining Co.	Gold ore
13	Cactus Queen	Mojave	Kern	21	Cactus Mines Co.	Gold-silver ore
14	Iron Mountain	Flat Creek (Iron Mountain)	Shasta	15	The Mountain Copper Co., Ltd.	Gold ore and copper ore
15	Alabama	Ophir	Placer	20	Alabama California Gold Mines Co.	Gold ore
16	Snelling	Snelling	Merced	14	Snelling Gold Dredging Co.	Dredge
17	Walker	Genesee	Plumas	22	Walker Mining Co.	Copper ore
18	Merced Unit	Snelling	Merced	16	Yuba Cons. Gold Fields	Dredge
19	Original Sixteen to One	Alleghany	Sierra	27	Original Sixteen to One Mine, Inc.	Gold ore
20	Siskiyou Unit	Callahan	Siskiyou	33	Yuba Cons. Gold Fields	Dredge
21	Golden Center	Grass Valley-Nevada City	Nevada	28	Cooley Butler	Gold ore
22	Carrville	Trinity Center	Trinity	147	Carrville Gold Co.	Dredge
23	Sliger	Mother Lode	El Dorado	19	Middle Fork Gold Mining Co.	Gold ore
24	Starlight	Mojave	Kern	23	Lodestar Mining Co.	Gold ore
25	Stockton Reservoir	Mother Lode	Calaveras	34	Lord & Bishop	Dragline

Total Gold Production of California.

The presence of gold in stream gravels near Los Angeles was known and worked in a small way by the Indians, at least as early as 1841,[1] and possibly 1820.[2] On March 2, 1844, Don Manuel Castanares,

* U. S. Bureau of Mines, Mineral Year Book Review of 1940, pp. 223-224.

[1] Hittell, T. H., History of California, Vol. II, p. 12, 1885.

[2] Bancroft, H. H., History of California, Vol. II, p. 417, 1886.

deputy for California to the Congress of Mexico, reported [1] to his government that placers near Los Angeles had produced up to December, 1843, a total of 2000 ounces of gold dust, most of which had been sent to the United States Mint at Philadelphia.

Photo by Walter W. Bradley

Headframe and mill of Keystone Mine, Amador City, Amador County.

As the padres and the rancheros discouraged the quest of gold, this early, small production caused no particular excitement. It was not until James W. Marshall's finding of gold nuggets in the tail-race of Sutter's saw mill on the American River, January 24, 1848, was heralded abroad that the great rush began, and California became a commonwealth of first rank almost over night. There are, however, no authentic data on gold production prior to 1848, other than occasional, scattered references such as above quoted.

The following table was originally compiled by Chas. G. Yale, of the Division of Mineral Resources, U. S. Geological Survey, but for a number of years statistician of the California State Mining Bureau and the U. S. Mint at San Francisco. The authorities chosen for certain periods were: J. D. Whitney, State Geologist of California; John Arthur Phillips, author of "Mining and Metallurgy of Gold and Silver" (1867); U. S. Mining Commissioner R. W. Raymond; U. S. Mining Commissioner J. Ross Browne; Wm. P. Blake, Commissioner from California to the Paris Exposition, where he made a report on "Precious Metals" (1867); John J. Valentine, author for many years of the annual report on precious metals published by Wells, Fargo & Company's Express; and Louis A. Garnett, in the early days manager of the San Francisco refinery, where records of gold receipts and shipments were kept. Mr. Yale obtained other data from the reports of the director of the U. S. Mint and the director of the U. S. Geological Survey. The authorities referred to who were alive at the time of the original compilation of this table in 1894 were all consulted in person

[1] Mercantile Trust Review of the Pacific, Vol. XIV, No. 2, p. 43, Feb. 15, 1925.

or by letter by Mr. Yale with reference to the correctness of their published data, and the final table quoted was then made up.

There was no premium paid on gold during 1932, the price being $20.67 a fine ounce. On August 29, 1933, there was an executive order lifting the embargo on gold ores, concentrates, precipitates, and unretorted amalgam, followed on October 25, 1933, by another order instructing the Reconstruction Finance Corporation to buy newly-mined gold at a price fixed by the U. S. Treasurer which corresponded to the world price, all of which had an effect on the 1933 gold yield. On January 30, 1934, the Gold Reserve Act of 1934 was passed, followed by the President's proclamation of January 31, 1934, which fixed the weight of the gold dollar at 15 5/21 grains, nine-tenths fine. The value of gold thereby became $35 a fine ounce. The average weighted value of gold per fine ounce in 1934 was $34.95.

The figures for 1903-1923 (inclusive) are those prepared by the U. S. Geological Survey; and since by the U. S. Bureau of Mines:

Total Gold Producton of California, 1848 to 1940

Year	Fine ounces	Value	Year	Fine ounces	Value
1848	11,866	$245,301	1896	831,158	$17,181,562
1849	491,072	10,151,360	1897	767,779	15,871,401
1850	1,996,586	41,273,106	1898	769,476	15,906,478
1851	3,673,512	75,938,232	1899	741,881	15,336,031
1852	3,932,631	81,294,700	1900	767,390	15,863,355
1853	3,270,803	67,613,487	1901	821,845	16,989,044
1854	3,358,867	69,433,931	1902	818,037	16,910,320
1855	2,684,106	55,485,395	1903	788,544	16,300,653
1856	2,782,018	57,509,411	1904	901,484	18,633,676
1857	2,110,513	43,628,172	1905	914,217	18,898,545
1858	2,253,846	46,591,140	1906	906,182	18,732,452
1859	2,217,829	45,846,599	1907	809,214	16,727,928
1860	2,133,104	44,095,163	1908	907,590	18,761,559
1861	2,026,187	41,884,995	1909	979,007	20,237,870
1862	1,879,595	38,854,668	1910	953,734	19,715,440
1863	1,136,897	23,501,736	1911	954,870	19,738,908
1864	1,164,455	24,071,423	1912	953,640	19,713,478
1865	867,405	17,930,858	1913	987,187	20,406,958
1866	828,367	17,123,867	1914	999,113	20,653,496
1867	883,591	18,265,452	1915	1,085,646	22,442,296
1868	849,265	17,555,867	1916	1,035,745	21,410,741
1869	881,830	18,229,044	1917	971,733	20,087,504
1870	844,537	17,458,133	1918	799,588	16,528,953
1871	845,493	17,477,885	1919	807,667	16,695,955
1872	748,951	15,482,194	1920	692,297	14,311,043
1873	726,554	15,019,210	1921	759,721	15,704,822
1874	835,186	17,264,536	1922	709,678	14,670,346
1875	816,377	16,876,009	1923	647,210	13,379,013
1876	755,169	15,610,723	1924	636,140	13,150,175
1877	798,249	16,501,268	1925	632,035	13,065,330
1878	911,343	18,839,141	1926	576,798	11,923,481
1879	949,439	19,626,654	1927	564,586	11,671,018
1880	968,986	20,030,761	1928	521,740	10,785,315
1881	929,920	19,223,155	1929	412,479	8,526,703
1882	829,458	17,146,416	1930	457,200	9,451,162
1883	1,176,329	24,316,873	1931	523,135	10,814,162
1884	657,900	13,600,000	1932	569,167	11,765,726
1885	612,478	12,661,044	1933	[a]613,579	15,683,075
1886	711,911	14,716,506	1934	[b]719,064	25,131,284
1887	657,349	13,588,614	1935	[c]890,430	31,165,050
1888	616,000	12,750,000	1936	1,077,442	37,710,470
1889	542,425	11,212,913	1937	1,174,578	41,110,230
1890	595,486	12,309,793	1938	1,311,129	45,889,515
1891	615,759	12,728,869	1939	1,435,264	50,234,240
1892	608,166	12,571,900	1940	1,455,671	50,948,485
1893	606,564	12,538,780			
1894	670,636	13,863,282	Totals	98,858,878	$2,162,108,431
1895	741,798	15,334,317			

[a] Value calculated at an average weighted price of $25.56 per fine ounce; previously $20.6718.
[b] Value calculated at an average weighted price of $34.95 per fine ounce.
[c] Value $35 per fine ounce, beginning 1935.

IRIDIUM (see under Platinum)

IRON ORE

Bibliography: State Mineralogist Reports II, IV, V, X, XII-XV (inc.), XVII, XVIII, XXI-XXVII (inc.), XXX, XXXI, XXXIII-XXXVI (inc.). Bulletins 38, 67, 91. Am. Inst. Min. Eng., Trans. LIII. Min. & Sci. Press, Vol. 115, pp. 112, 117-122; Vol. 123, pp. 94-96, 113-114.

During the year 1940 there were shipments of iron ore in California coming from two properties in Inyo County; and one in Santa Cruz County; the annual details are concealed under the 'Unapportioned' item to conceal the output of individual producers. The 1940 output showed a decrease both in amount and value as compared with that of 1939 which was 16,990 tons worth $77,788.

The material mined during the year was hematite from Inyo and San Bernardino counties, and magnetite sands from Santa Cruz County. The hematite was used mostly in high-iron cement with some going to foundries as a flux.

There are considerable deposits of iron ore known in California, notably in Shasta, Madera, Placer, Riverside, San Bernardino, and Los Angeles counties, but production has so far been limited for lack of an economic supply of coking coal. Some pig iron has been made, utilizing charcoal for fuel, both in blast furnaces and by electrical reduction; also, ferrochrome, ferromanganese, and ferrosilicon have been made in California.

Iron Ore Production in California, by Years.

Total iron ore production of California, with annual amounts and values, is as follows:

Year	Tons	Value	Year	Tons	Value
1881[a]	9,273	$79,452	1919	2,300	$13,796
1882	2,073	17,766	1920	5,975	40,889
1883	11,191	106,540	1921	1,970	12,030
1884	4,532	40,983	1922	3,588	18,868
1885			1923	3,102	18,665
1886	3,676	19,250	1924		
1887			1925[b]	785	4,710
1893	250	2,000	1926		
1894	200	1,500	1927[b]	5,272	26,000
1895			1928		
1907	400	400	1930		
1908			1931[b]	100	700
1909	108	174	1932		
1910	579	900	1934		
1911	558	558	1935[b]	38,339	163,714
1912	2,508	2,508	1936	31,084	155,434
1913	2,343	4,485	1937	5,490	29,340
1914	1,436	5,128	1938	27,878	141,406
1915	724	2,584	1939	16,990	77,788
1916	3,000	6,000	1940	[b]	[b]
1917	2,874	11,496			
1918	3,108	15,947	Totals	191,586	$1,121,011

[a] Productions for the years 1881-1886 (inc.) were reported as "tons of pig iron" (U.S.G.S., Min. Res. 1885), and for the table herewith are calculated to "tons of ore" on the basis of 47.6% Fe as shown by an average of analyses of the ores (State Mineralogist Report IV, p. 242). This early production of pig iron was from the blast furnaces then in operation at Hotaling in Placer County. Charcoal was used in lieu of coke. Though producing a superior grade of metal, they were obliged finally to close down, as they could not compete with the cheaper English and eastern United States iron brought in by sea to San Francisco.

[b] Annual details concealed under 'Unapportioned.'

LEAD

Bibliography: State Mineralogist Reports IV, VIII-XV (inc), XVII-XXVIII (inc.), XXX, XXXI, XXXIII-XXXVI (inc.).

The output of lead in California during 1940 amounted to 3,092,636 pounds of recoverable metal valued at $154,632, compared with 1,061,294 pounds worth $49,880. The average price of lead for 1940 was 5.0¢ per pound compared with 4.7¢ per pound in 1939; 4.6¢ per pound in 1938; 5.9¢ per pound in 1937; 4.6¢ per pound in 1936; and 4.0¢ in 1935.

Distribution of the 1940 output of lead by counties was as follows:

County	Pounds	Value
Amador	11,459	$573
Inyo	2,130,330	106,516
Kern	27,133	1,357
Madera	2,860	143
Mariposa	27,725	1,386
Mono	140,666	7,033
Nevada	8,593	430
Orange	38,571	1,928
Placer	43,376	2,169
Plumas	88,162	4,408
Riverside	536,457	26,823
San Bernardino	31,375	1,569
Calaveras, El Dorado, Shasta, Trinity, Tuolumne*	5,931	298
Totals	3,092,636	$154,632

* Combined to conceal the output of individual operators in each.

Lead Production of the United States.

According to preliminary data issued by the U. S. Bureau of Mines[1] during 1940, the production of primary lead in the United States was 433,065 short tons valued at $43,307,000, being an increase over the national production of 1939, which was 420,967 short tons worth $39,571,000.

[1] U. S. Bureau of Mines, Mineral Market Notes 923, May 29, 1941.

Lead Production of California, by Years.

Statistics on lead production in California were first compiled by this Bureau in 1887. Amount and value of the output, annually, with total figures, to date, are given in the following table:

Lead Production of California, by Years

Year	Pounds	Value	Year	Pounds	Value
1877	[a]7,836,000	$391,800	1910	3,016,902	$134,082
1878	8,640,000	328,320	1911	1,403,839	63,173
1879	4,502,000	191,335	1912	1,370,067	61,653
1880	4,200,000	215,460	1913	3,640,951	160,202
1881	6,680,000	325,316	1914	4,697,400	183,198
1882	[b]4,000,000	196,800	1915	4,796,299	225,426
1883	[c]3,400,000	145,520	1916	12,392,031	855,049
1884	3,200,000	120,512	1917	21,651,352	1,862,016
1885	2,000,000	80,900	1918	13,464,869	956,006
1886	2,000,000	93,400	1919	4,139,562	219,397
1887	[d]1,160,000	52,200	1920	4,903,738	392,300
1888	900,000	38,250	1921	1,149,051	51,707
1889	940,000	35,720	1922	6,511,280	358,120
1890	800,000	36,000	1923	9,934,522	695,416
1891	1,140,000	49,020	1924	4,984,387	398,751
1892	1,360,000	54,400	1925	7,352,422	639,661
1893	666,000	24,975	1926	8,067,873	645,429
1894	950,000	28,500	1927	2,748,440	173,151
1895	1,592,400	49,364	1928	1,882,795	109,102
1896	1,293,500	38,805	1929	1,428,777	90,014
1897	596,000	20,264	1930	3,542,796	176,241
1898	655,000	23,907	1931	3,934,240	145,568
1899	721,000	30,642	1932	2,418,626	72,480
1900	1,040,000	41,600	1933	772,463	28,583
1901	720,500	28,820	1934	804,911	29,655
1902	349,440	12,230	1935	1,142,405	45,695
1903	110,000	3,960	1936	1,098,545	50,533
1904	124,000	5,270	1937	2,402,110	141,724
1905	533,680	25,033	1938	1,003,096	46,142
1906	338,718	19,307	1939	1,061,294	49,880
1907	328,681	16,690	1940	3,092,636	154,632
1908	1,124,483	46,663			
1909	2,685,477	144,897	Totals	207,396,558	$12,030,916

[a] Quantities for 1877-1881 (inc.) from C. E. Siebenthal, Mineral Resources of U. S. 1912, Part I, U. S. Geol. Survey, p. 339; and values for same years from quotations in Eng. & Min. Jour. of New York.
[b] Estimated.
[c] Quantities and values for 1883-1886 (inc.) from Mineral Resources of U. S. Geol. Surv., 1883-1886, respectively.
[d] Data from 1887 to date from reports of California State Mining Bureau.

MANGANESE

Bibliography: State Mineralogist Reports XII-XV (inc.), XVIII, XXII-XXVII (inc.), XXIX-XXXI, XXXIII-XXXVII (inc.). Bulletins 38, 67, 76, 91. U. S. G. S. Bull. 427. Eng. & Min. Jour.-Press, Vol. 117, p. 545.

Manganese ore was shipped during 1940 in California from two properties each in San Bernardino and Stanislaus counties amounting to 314 short tons valued at $3,260. This material varied in grade from 33.52% Mn to 46.88% Mn and was utilized in the manufacture of batteries and in steel. In 1939 a sample shipment of manganese concentrates assaying 50% manganese was made from Imperial County and was the first output since 1935. The annual details are concealed under the 'Unapportioned' item as one operator made all the shipments.

Imports of foreign manganese ore in the United States[1] during 1940 amounted to 1,320,877 long tons of ore containing 628,163 long

[1] U. S. Bureau of Foreign and Domestic Commerce, Monthly Summary, December, 1940.

tons of manganese valued at $18,398,645, as compared with 657,813 long tons of ore containing 322,708 long tons of manganese worth $8,628,059 in 1939.

The Tariff Act of 1930 provides for an import duty of 1¢ per pound on the metallic manganese contained, for "manganese ore (including ferruginous manganese ore) or concentrates containing in excess of 10 per centum of metallic manganese."

Manganese Ore Production in California, by Years.

Production of manganese ore in California began at the Ladd Mine, San Joaquin County, in the Tesla District in 1867. When shipments of this ore to England ceased late in 1874, upwards of 5000 tons had been produced by that property. For some years following that, the output was small. The tabulation herewith shows California's output of manganese ore, annually, since 1887, when the compilation of such figures was begun by the State Mining Bureau:

Year	Tons	Value	Year	Tons	Value
1887	1,000	$9,000	1913		
1888	1,500	13,500	1914	150	$1,500
1889	53	901	1915	4,013	49,098
1890	386	3,176	1916	13,404	274,601
1891	705	3,830	1917	15,515	396,659
1892	300	3,000	1918	26,075	979,235
1893	270	4,050	1919	11,569	451,422
1894	523	5,512	1920	2,892	62,323
1895	880	8,200	1921	1,005	12,210
1896	518	3,415	1922	540	7,650
1897	504	4,080	1923	690	10,620
1898	440	2,102	1924	1,115	25,785
1899	295	3,165	1925	832	19,450
1900	131	1,310	1926	235	4,700
1901	425	4,405	1927		
1902	870	7,140	1928	733	8,216
1903	1	25	1929		
1904	60	900	1930	207	2,576
1905			1931		
1906	1	30	1932		
1907	1	25	1934	432	4,630
1908	321	5,785	1935		
1909	3	75	1936		
1910	265	4,235	1939	6	45
1911	2	40	1940	314	3,260
1912	22	400			
			Totals	89,203	$2,302,281

*Annual details concealed under 'Unapportioned.'

MOLYBDENUM

Bibliography: State Mineralogist Reports XIV, XVII-XXIV (inc.), XXVI-XXVIII (inc.), XXX, XXXIV, XXXV, XXXVI. Bulletins 67, 91. U. S. Bur. of Min., Bulletin 111. Proc. Colo. Sci. Soc., Vol. XI.

Molybdenum is used as an alloy constituent in the steel industry, and in certain forms of electrical apparatus. Included in the latter is its successful substitution for platinum and platinum-iridium in electric contact-making and -breaking devices. In alloys it is used similarly to and in conjunction with chromium, cobalt, iron, manganese, nickel, tungsten and vanadium. The oxides and the ammonium salt have important chemical uses.

The two principal molybdenum minerals are: the sulphide, molybdenite, and wulfenite, lead molybdate; the former furnishing prac-

tically the entire commercial output. Molybdenite is found in or associated with acidic igneous rocks, such as granite and pegmatite.

Deposits of disseminated molybdenite are known in several localities in California, and in at least two places it occurs in small masses associated with copper sulphides. The first recorded commercial shipments of molybdenum ore in California were during the war, 1916-1918. Some development work has been done on a high-grade deposit at the head of the KaWeah River, Tulare County.

During 1940 and 1939 there were shipments of molybdenum concentrates in California coming from a tungsten mine in Inyo County. The amount in 1940 was greater than the total of all previous production. In 1933 and 1934 there were shipments of molybdenum concentrates in California amounting to 1432 pounds 91.23% MoS_2 valued at $306. The annual details are combined under the 'Unapportioned' item to conceal the output of a single operator.

The growing consumption of molybdenum by alloy-steel makers in the United States has been stimulated by the fact that molydenum alone of the steel-alloying metals can be produced commercially in the United States to an extent which avoids all necessity for importation. Another fact has been the marked adaptability of molybdenum steels to large-scale production of automobile and other parts.

The Tariff Act of 1930 provides for an import duty of 35 cents a pound for the metallic molybdenum content of molybdenum ores or concentrates.

The present (July 17, 1941) quotations on molybdenum ores are 45¢ per pound of MoS_2 contained, f.o.b. mine, and on ferromolybdenum are 95¢ per pound Mo, 55%-65% Mo f.o.b. shipping point.

Molybdenum Production of California, by years.

California's production of molybdenum ore by years is summarized in the following tabulation:

Year	*Pounds of MoS_2*	*Value*
1916	9,280	$9,945
1917	7,290	9,014
1918	----	----
1919	270	300
1933		
1934 [a]	1,306	306
1939		
1940 [a]	383,233	147,126
Totals	401,379	$166,691

[a] Annual details concealed under 'Unapportioned.'

NICKEL

Bibliography: State Mineralogist Reports XIV, XVII, XXIV, XXV, XXVIII, XXX, XXXIV-XXXVI (inc.). U. S. G. S., Bulletin 640-D. U. S. Bureau of Standards, Circular 100.

Nickel occurs in the Friday Copper Mine in the Julian District, San Diego County. The ore is a nickel-bearing pyrrhotite, with some associated chalcopyrite. Some ore has been mined in the course of development work but not treated nor disposed of, as they were unable to get any smelter to handle it for them. Nickel ore has also been reported from other localities in California, but not yet confirmed.

Present (July 17, 1941) quotations for nickel are around 35¢ per pound for the refined metal.

OSMIUM (see under Platinum)

PALLADIUM (see under Platinum)

PLATINUM GROUP METALS

Bibliography: State Mineralogist Reports IV, VIII, IX, XII-XXVI (inc.), XXVIII, XXX, XXXI, XXXIV-XXXVI (inc.), Bulletins 38, 45, 67, 85, 91, 92. U. S. Geol. Surv., Bulletins 193, 285. Trans. Am. Inst. Min. Eng., Vol. 47, pp. 217-218.

In California the platinum-group metals are obtained as a by-product from placer operations for gold. The major portion of it comes from the dredges working in Amador, Butte, Merced, Sacramento, Stanislaus, Shasta, Trinity and Yuba counties, with a small amount coming from the hydraulic and surface sluicing mines of Del Norte, Humboldt, Siskiyou and Trinity counties.

The platinum-group metals shipped in California during 1940 amounted to 1590 ounces crude containing 1358 fine ounces of metals valued at $62,419 of which were 989 fine ounces of platinum, 137 fine ounces of iridium, 148 fine ounces of osmium, 30 fine ounces of ruthenium, 3 fine ounces of palladium, and 51 fine ounces of osmium, iridium, palladium, etc. This metal came from properties in Amador, Butte, Calaveras, Merced, Placer, Plumas, Sacramento, San Joaquin, Shasta, Siskiyou, Stanislaus, Trinity, and Yuba counties.

The 1940 output was an increase in both amount and value as compared with that of 1939 which was 1020 ounces crude containing 896 fine ounces worth $32,135.

Present quotations[1] (July 17, 1941) are, platinum $36 a fine ounce; iridium 99 per cent plus, $175; osmium per fine ounce, $45 to $48; palladium per fine ounce, $24; ruthenium per fine ounce $35 to $40; rhodium per fine ounce, $125.

Platinum Production of California, by Years.

The annual production and values since 1887 have been as follows:

Year	Ounces	Value	Year	Ounces	Value
1887	416	$10,400	1915	667	$21,149
1888	100	400	1916	886	42,642
1889	500	2,000	1917	610	43,719
1890	500	2,000	1918	571	42,788
1891	600	2,500	1919	*418	60,611
1892	100	500	1920	477	68,977
1893	80	440	1921	613	58,754
1894	75	517	1922	795	90,288
1895	100	600	1923	602	78,546
1896	150	900	1924	273	36,452
1897	162	944	1925	292	39,937
1898	150	900	1926	322	32,005
1899	300	1,800	1927	139	10,749
1900	300	1,800	1928	312	27,902
1901	400	2,500	1929	212	14,416
1902	250	3,200	1930	217	11,700
1903	39	468	1931	305	11,979
1904	70	1,052	1932	278	8,142
1905	123	1,849	1933	236	7,255
1906	200	3,320	1934	424	14,884
1907	91	1,647	1935	121	4,153
1908	300	6,255	1936	1,000	40,669
1909	706	13,414	1937	530	23,704
1910	337	8,386	1938	1,069	35,150
1911	511	14,873	1939	896	32,135
1912	603	19,731	1940	1,358	62,419
1913	368	17,738			
1914	463	14,816	Totals	21,611	$1,056,075

* Fine ounces, beginning with 1919.

[1] E. & M. J., Metal and Mineral Markets, May 2, 1940.

QUICKSILVER

Bibliography: State Mineralogist Reports IV, V, XII-XV, XVII-XXIX (inc.), XXXI, XXXIII-XXXVI (inc.). Bulletins 27, 78, 91. U. S. Geol. Surv., Monograph XIII. U. S. Bur. of Mines, Tech. Papers 96, 227; Bulletin 222, 335.

The production of quicksilver in California during 1940 amounted to 18,907 flasks valued at $3,209,754, compared with 11,201 flasks worth $1,105,563 in 1939. The 1940 output came from 101 properties in 20 counties and was distributed as follows:

County	*Flasks*	*Value*
Kings	23	$3,827
Lake	4,966	845,592
Monterey	42	6,972
Napa	1,479	245,757
San Benito	6,164	1,062,539
San Luis Obispo	1,470	243,832
Santa Barbara	500	81,223
Santa Clara	1,034	170,837
Sonoma	1,144	188,469
Alpine, Colusa, Contra Costa, Fresno, Inyo, Kern, Orange, San Bernardino, Solano, Trinity, Yolo*	2,085	360,708
Totals	18,907	$3,209,754

* Combined to conceal the output of operators in each.

During 1940 the average for New York quotations[1] for quicksilver was $176.865 per 76-pound flask, compared with $103.94 per flask for 1939. The average monthly quotation for January, 1940, was $156.962 per flask, with the trend of prices continuing upward until June with an average quotation of $197.36 per flask; from here the prices dropped till the end of the year; December quotations were $165.96 per flask. In 1941 the prices began to rise again with the average quotation for June at $183.92 per flask and the trend still continuing upward. The average amount received by California producers during 1940 was $169.77 per 76-pound flask, this being the highest average annual price ever received in this State. The average received by the miner in 1939 was $98.43 per flask.

The U. S. Bureau of Mines[2] reported the total production of the United States for 1940 to be 37,777 flasks valued at $6,681,618, compared with 18,633 flasks worth $1,936,714 for 1939. As in the past, California was the largest producing State by a large margin with 55 per cent of the total, other producing States being Oregon, Nevada, Arkansas, Idaho, Arizona, Texas, Washington, and Utah.

During 1940 imports of quicksilver for domestic consumption amounted to 171 flasks valued at $17,961, compared with 3,499 flasks worth $336,744 in 1939 according to the U. S. Bureau of Foreign and Domestic Commerce.

Total Quicksilver Production of California.

Total amount and value of the quicksilver production of California, as given in available records, are shown in the following tabulation. Though the New Almaden Mine in Santa Clara County was first worked in 1824, and was in practically continuous operation from 1846 to 1921 (the yield being small the first two years), there are no available data on the output earlier than 1850. Previous to June, 1904, a 'flask' of quicksilver contained 76½ pounds; then 75 pounds up to and includ-

[1] Engineering and Mining Journal, 1940, Vol. 141.
[2] U. S. Bureau of Mines, Mineral Report 921, May 26, 1941.

ing 1927; beginning with 1928, 76 pounds. In compiling this table the following sources of information were used: for 1850-1883, table by J. B. Randol, in Report of State Mineralogist IV, p. 336; 1883-1893, U. S. Geological Survey reports; 1894 to date, statistical bulletins of the State Mining Bureau; also State Mining Bureau, Bulletin 27, "Quicksilver Resources of California," 1908, p. 10.

Year	Flasks	Value	Average price per flask	Year	Flasks	Value	Average price per flask
1850	7,723	$768,052	$99 45	1897	26,691	$993,445	$37 28
1851	27,779	1,859,248	66 93	1898	31,092	1,188,626	38 23
1852	20,000	1,166,600	58 33	1899	29,454	1,405,045	47 70
1853	22,284	1,235,648	55 45	1900	26,317	1,182,786	44 94
1854	30,004	1,663,722	55 45	1901	26,720	1,285,014	48 46
1855	33,000	1,767,150	53 55	1902	29,552	1,276,524	43 20
1856	30,000	1,549,500	51 65	1903	32,094	1,335,954	42 25
1857	28,204	1,374,381	48 73	1904	[a]28,876	1,086,323	37 62
1858	31,000	1,482,730	47 83	1905	24,555	886,081	35 94
1859	13,000	820,690	63 13	1906	19,516	712,334	36 50
1860	10,000	535,500	53 55	1907	17,379	663,178	38 16
1861	35,000	1,471,750	42 05	1908	18,039	763,520	42 33
1862	42,000	1,526,700	36 35	1909	16,217	773,788	47 71
1863	40,531	1,705,544	42 08	1910	17,665	799,002	45 23
1864	47,489	2,179,745	45 90	1911	19,109	879,205	46 01
1865	53,000	2,432,700	45 90	1912	20,600	866,024	42 04
1866	46,550	2,473,202	53 13	1913	15,661	630,042	40 23
1867	47,000	2,157,300	45 90	1914	11,373	557,846	49 05
1868	47,728	2,190,715	45 90	1915	14,199	1,157,449	81 52
1869	33,811	1,551,925	45 90	1916	21,427	2,003,425	93 50
1870	30,077	1,725,818	57 38	1917	24,382	2,396,466	98 29
1871	31,686	1,999,387	63 10	1918	22,621	2,579,472	114 03
1872	31,621	2,084,773	65 93	1919	15,200	1,353,381	89 04
1873	27,642	2,220,482	80 33	1920	10,278	775,527	75 45
1874	27,756	2,919,376	105 18	1921	3,157	140,666	44 56
1875	50,250	4,228,538	84 15	1922	3,466	191,851	55 35
1876	75,074	3,303,256	44 00	1923	5,458	332,851	60 98
1877	79,396	2,961,471	37 30	1924	7,948	543,080	68 33
1878	63,880	2,101,652	32 90	1925	7,683	621,831	80 81
1879	73,684	2,194,674	29 85	1926	5,892	516,382	87 64
1880	59,926	1,857,706	31 00	1927	6,488	714,418	111 67
1881	60,851	1,815,185	29 83	1928	[b]7,107	844,649	118 84
1882	52,732	1,488,624	28 23	1929	10,152	1,195,705	117 78
1883	46,725	1,343,344	28 75	1930	11,374	1,255,257	110 36
1884	31,913	973,347	30 50	1931	13,478	1,121,624	83 22
1885	32,073	986,245	30 75	1932	5,349	279,780	52 30
1886	29,981	1,064,326	35 50	1933	4,102	229,472	55 94
1887	33,760	1,430,749	42 38	1934	7,946	534,135	67 22
1888	33,250	1,413,125	42 50	1935	9,353	628,590	67 23
1889	26,464	1,190,880	45 00	1936	8,758	671,055	76 62
1890	22,926	1,203,615	52 50	1937	9,995	837,789	83 82
1891	22,904	1,036,406	45 25	1938	12,171	846,497	69 55
1892	27,993	1,139,595	40 71	1939	11,201	1,105,563	98 43
1893	30,164	1,108,527	36 75	1940	18,907	3,209,754	169 77
1894	30,416	934,000	30 70				
1895	36,104	1,337,131	37 04	Totals	2,435,218	$122,421,889	
1896	30,765	1,075,449	34 96				

[a] Flasks of 75 lbs. from June, 1904; of 76½ lbs. previously.
[b] Flasks of 76 pounds, from January, 1928.

SILVER

Bibliography: State Mineralogist Reports IV, VIII, XII-XXXVI (inc.). Bulletins 67, 91, 108. Min. & Sci. Press, March 1, 1919.

The 1940 output of silver in California totaled 2,359,776 fine ounces valued at $1,678,063, being a decrease in both amount and value as compared with the 1939 production, which was 2,599,139 fine ounces worth $1,764,863. Of the 1940 output 64,170 fine ounces worth $45,632 came from placers and the remainder was from lode ores. The average price paid for newly mined domestic silver was 71.11¢ per fine ounce in 1940; 67.80¢ in 1939; 64.60¢ in 1938; 77.35¢ in 1937; 77.45¢ in 1936; 71.875¢ in 1935; and 64.60¢ in 1934.

Photo by Walter W. Bradley

Zaca Mine near Markleeville, Alpine County.

Silver production by counties for 1940 was as follows:

County	*Fine ounces*	*Value*
Alpine	1,160	$825
Amador	23,081	16,413
Butte	21,035	14,958
Calaveras	17,648	12,550
Del Norte	4	3
El Dorado	5,216	3,709
Fresno	231	164
Humboldt	86	61
Imperial	2,623	1,865
Inyo	86,658	61,623
Kern	831,949	591,608
Lassen	83	59
Los Angeles	2,957	2,103
Madera	478	340
Mariposa	9,303	6,615
Merced	4,891	3,478
Modoc	4	3
Mono	146,682	104,307
Monterey and Napa*	129,259	91,918
Nevada	428,975	305,049
Orange	15,172	10,789
Placer	60,029	42,687
Plumas	254,956	181,302
Riverside	31,654	22,510
Sacramento	9,951	7,076
San Bernardino	145,319	103,338
San Diego	180	128
San Francisco	7	5
San Joaquin	911	648
Santa Barbara	7	5
Santa Cruz	6	4
Shasta	92,102	65,495
Sierra	4,013	2,854
Siskiyou	9,353	6,651
Stanislaus	2,597	1,847
Trinity	5,937	4,222
Tulare	7	5
Tuolumne	4,916	3,496
Ventura	7	5
Yuba	10,329	7,345
Totals	2,359,776	$1,678,063

* Combined to avoid disclosure of individual output.

The following paragraph is quoted from the U. S. Bureau of Mines,[1] chapter on Gold and Silver from Mineral Year Book 1940, by courtesy of Charles White Merrill and H. M. Gaylord.

"*Silver.* The bulk of the silver output of California in 1940 was more centralized than that of the gold; the ten leading silver-producing mines, listed in the following table, yielded 75 percent of the State's total recoverable silver in that year. The list is similar to that of 1939, except for some changes in rank and replacement of the Alabama mine (Placer County) by the Iron Mountain mine (Shasta County). In addition to the mines listed, some silver was reported recovered from almost every lode and placer mine operating in the State in 1940."

Ten Leading Silver-producing Mines in California in 1940, in Order of Output

Rank	Mine	District	County	Rank in 1940	Operator	Source of silver
1	Cactus Queen	Mojave	Kern	1	Cactus Mines Co.	Gold-silver ore
2	Lava Cap	Grass Valley-Nevada City	Nevada	4	Lava Cap Gold Mining Corp.	Gold ore
3	Walker	Genesee	Plumas	6	Walker Mining Co.	Copper ore
4	Golden Queen	Mojave	Kern	2	Golden Queen Mining Co.	Gold ore
5	Starlight	Mojave	Kern	5	Lodestar Mining Co.	Gold ore
6	Grigsby (Palisade)	Calistoga	Napa	3	Graham Loftus Oil Corp.	Gold-silver ore
7	Kelly	Randsburg	San Bernardino	7	F. Royer and Lessees	Gold-silver ore
8	Iron Mountain	Flat Creek (Iron Mountain)	Shasta	12	The Mountain Copper Co., Ltd.	Gold and copper ores
9	Standard	Bodie	Mono	9	Roseklip Mines Co.	Gold ore
10	Empire Star Mines	Grass Valley-Nevada City	Nevada	8	Empire Star Mines Co., Ltd.	Gold ore

Silver Production of California, by Years.

The amount and value of the silver production of California, and the average price, annually, since 1880 are given in the table following. In the table shown in the statistical bulletins previous to Bulletin 97 (for 1925), the values shown for 1880-1904 (inc.) were taken from the reports of the Director of the Mint, of which the figures for 1880-1896 (inc.) were based on 'coinage value' ($1.2929 per fine ounce). We have recalculated these to commercial value, using the price table of the U. S. Geological Survey (McCaskey, H. D.), Gold and Silver, 1913: Mineral Resources of the U. S., Part I, p. 847. From 1905 to date, the figures are those of the U. S. Geological Survey and its successor, the U. S. Bureau of Mines. Figures for the years prior to 1880 are not available, as there were no reliable records compiled.

[1] U. S. Bureau of Mines, Mineral Year Book, 1941, page 224.

Silver Production of California, by Years, Since 1880

Year	Fine oz.	Value	Average price per oz.	Year	Fine oz.	Value	Average price per oz.
1880	882,169	$1,014,494	$1 15	1912	1,300,136	$799,584	$0 615
1881	580,091	655,503	1 13	1913	1,378,399	832,553	604
1882	653,569	745,069	1 14	1914	1,471,859	813,938	553
1883	1,129,244	1,253,461	1 11	1915	1,678,756	851,129	507
1884	3,236,987	3,593,056	1 11	1916	2,564,354	1,687,345	658
1885	1,968,260	2,125,298	1 07	1917	1,775,431	1,462,955	824
1886	1,245,747	1,233,290	99	1918	1,427,711	1,427,711	1 00
1887	1,262,282	1,237,036	98	1919	1,107,189	1,240,051	1 12
1888	1,314,874	1,235,982	94	1920	1,706,327	1,859,896	1 09
1889	823,947	774,510	94	1921	3,629,223	3,629,223	1 00
1890	820,336	861,353	1 05	1922	3,100,065	3,100,065	1 00
1891	737,224	729,852	99	1923	3,559,443	2,918,743	82
1892	358,575	311,960	87	1924	3,555,133	2,381,952	67
1893	415,468	324,065	78	1925	3,054,416	2,119,765	694
1894	229,896	144,834	63	1926	2,022,460	1,262,015	624
1895	463,911	301,542	65	1927	1,620,242	918,677	567
1896	326,757	222,105	68	1928	1,478,711	865,081	585
1897	754,648	452,789	60	1929	1,176,895	627,285	533
1898	701,788	414,055	59	1930	1,622,803	624,779	385
1899	855,869	513,521	60	1931	867,818	251,667	290
1900	1,168,157	724,257	62	1932	493,533	139,176	282
1901	950,831	570,499	60	1933	402,591	140,907	350
1902	1,163,041	616,412	53	1934	844,413	545,883	[a]644
1903	958,230	517,444	54	1935	1,191,112	856,112	[a]719
1904	1,441,259	835,929	58	1936	2,103,799	1,629,392	[a]775
1905	1,076,174	650,009	61	1937	2,888,265	2,234,073	[a]774
1906	1,220,641	817,830	68	1938	2,590,804	1,674,863	[a]646
1907	1,138,856	751,646	66	1939	2,599,139	1,764,264	[a]678
1908	1,647,278	873,057	53	1940	2,359,776	1,678,063	[a]711
1909	2,098,253	1,091,092	52				
1910	1,840,085	993,646	54	Totals	91,313,575	$67,596,179	
1911	1,270,445	673,336	53				

[a]Average price applied to newly mined within the United States.

TIN

Bibliography: Reports XV, XVII, XVIII, XXV, XXXI, XXXIV, XXXV-XXXVI. Bulletins 67, 91.

During 1940 there was some development at the Apex Mine nine miles north of Cima, San Bernardino County. Here the tin ore occurs in small kidneys along the talcose slip in dolomitic limestone.

In 1928 and 1929 there was a small amount of tin produced from California ore as well as considerable development work which was done at the Temescal mine in Riverside County near Corona. There was an output from the district during 1891-1892 as tabulated below. Small quantities of stream tin have been found in some of the placer workings in northern California, but never in paying amounts.

Two occurrences have also been noted, in northern San Diego County. Crystals of cassiterite were found there, associated with blue tourmaline crystals, amblygonite and beryl. No commercial quantity has been developed, only small pockets having been taken out.

Total Output of Tin in California

Year	Pounds	Value
1891	125,289	$27,564
1892	126,000	32,400
1928|		
1929| [a]	1,200	580
Totals	252,489	$60,544

[a]Annual details concealed under 'Unapportioned.'

TITANIUM

Bibliography: State Mineralogist's Report XXIII, XXXIV.

During 1939 and 1940 there were small shipments of titanium ore (ilmenite) made from material recovered from beach sand at Hermosa Beach, Los Angeles County. The annual details are concealed under the 'Unapportioned' item to conceal the output of an individual producer.

Also during the year the E. I. du Pont de Nemours Company continued to do exploration work on the deposit of ilmenite in the San Gabriel Mountains in Los Angeles County to determine the extent of the deposit. They have also run an experimental test on the ores for commercializing it in the near future.

In 1927 the first recorded shipments of titanium minerals were made in California. The total of the 1927 and 1928 production was 10,013 tons valued at $150,195. All of this came from Los Angeles County and was produced from either the beach black sands which contained approximately 20% titaniferous iron and magnetite, the gangue being silica and several silicates, or from a lode deposit in the San Gabriel Mountains.

The metal is used in several different alloys with iron, copper and aluminum and for green and white paint pigments, the only colors of titanium pigments now in common use. It is also used in dyes, rubber, as a porcelain glaze, in glass, and cement made from high-titanium iron slags. This cement is resistant to the action of acids.

The market price of titanium minerals varies as to the titanium oxide it contains. Present (July 17, 1941) quotations are: Rutile 94% TiO at 8¢ to 10¢ a pound, ilmenite 50 to 60% TiO at $28 to $30 a ton, all prices Atlantic seaboard.

Total Output of Titanium in California by Years

Year	Tons	Value
1927, 1928*	10,013	$150,195
1929	-----	-------
1939, 1940*	160	1,800
Totals	10,173	$151,995

* Annual details concealed under 'Unapportioned.'

TUNGSTEN

Bibliography: Reports XV, XVII, XVIII, XXII, XXIV, XXVII (inc.) XXX, XXXIV-XXXVII (inc.). Bulletins 38, 67, 91, 95, U. S. G. S., Bull. 652. Proc. Colo. Sci. Soc., Vol. XI. South Dakota School of Mines, Bulletin No. 12. Eng. and Min. Jour.-Press, Vol. 113, pp. 666-669, Apr. 22, 1922.

The commercial production of tungsten ores and concentrates in California began in 1905; and has been continuous since, with the exception of 1920-1922, inclusive. The material shipped in 1940 was high-grade sorted ore and concentrates, came from four properties in Inyo County, two in San Bernardino County, and a single property each in Fresno, Kern, Mono, and Tulare counties. A total of 1871 short tons of tungsten concentrates averaging 57.2% WO_3 was reported

shipped yielding 107,022 units or 1784 tons of 60% WO_3 valued at $2,267,135 at the mine. The 1940 output showed an increase in both amount and value as compared with that of 1939, which was 1,221 tons concentrates containing 74,110 units or 1,235 tons of 60% WO_3 worth $1,153,735. The 1940 output of tungsten ore was the largest since 1918.

Quotations in the E. & M. J. Metal and Mineral Markets during 1940 varied for Chineses wolframite duty paid $23 to $26 per unit WO_3, and for domestic scheelite from $21 to $25 per unit of WO_3 in carload lots at mine, the lower prices prevailed at the beginning of the year and continued until August with the highest quotations in December. The California miner received an average price of $21.184 per unit WO_3 at mine. Present quotations (July 17, 1941) are Chinese wolframite $24 per unit WO_3 duty paid; and domestic scheelite $23 to $24 per unit WO_3 at mine.

Photo by Walter W. Bradley

Pine Creek Tungsten Mine, upper (pilot) mill, 500 tons capacity, of U. S. Vanadium Corp., near Bishop, Inyo County.

Imports of foreign tungsten ores and concentrates during 1940 according to the U. S. Bureau of Foreign and Domestic Commerce amounted to 36,652 pounds valued at $41,041, compared with 2,743,472 pounds worth $997,971 in 1939. The Tariff Act of 1930 raised the duty on tungsten ore or concentrates to 50 cents per pound on the metallic tungsten contained therein. Duties are also provided for imported tungsten-bearing alloys.

Tungsten ore has been produced in California principally in the Atolia-Randsburg district in San Bernardino and Kern counties, followed by the Bishop district in Inyo County, with small amounts coming from Nevada County and from the district near Goffs, in eastern

San Bernardino. Most of California's tungsten ore is scheelite (calcium tungstate), though wolframite (iron-manganese tungstate) and hübernite (manganese tungstate) also occur. The deposits at Atolia were the largest and most productive scheelite deposits known, previous to 1930.[1] (Since passed by Mill City District, Nevada.)

Total Tungsten Ore Production of California.

The annual amount and value of tungsten ores and concentrates produced in California since the inception of the industry is given herewith, with tonnages recalculated to 60% WO_3:

Year	Tons at 60% WO_3	Value	Year	Tons at 60% WO_3	Value
1905	57	$18,800	1925	573	$348,475
1906	485	189,100	1926	441	316,560
1907	287	120,587	1927–1928[a]	389	429,237
1908	105	37,750	1929	150	106,280
1909	577	190,500	1930–1931[a]	120	82,582
1910	457	208,245	1932	26	9,509
1911	387	127,706	1933	148	76,605
1912	572	206,000	1934	261	224,417
1913	559	234,673	1935	118	194,542
1914	420	180,575	1936	236	210,819
1915	962	1,005,467	1937	611	782,187
1916	2,270	4,571,521	1938	732	786,860
1917	2,466	3,079,013	1939	1,235	1,153,735
1918	1,982	2,832,222	1940	1,784	2,267,135
1919	214	219,316			
1920					
1923	34	19,126			
1924	781	446,009	Totals	19,448	$20,675,449

[a] Annual details concealed under 'Unapportioned.'

VANADIUM

Bibliography: Reports XV, XXVI. Bulletins 67, 91. Proc. Colo. Sci. Soc., Vol. XI, XXXVI. U. S. Bur. of Mines, Bulletin 104.

No commercial production of vanadium has yet been made in California. Occurrences of this metal have been found at Camp Signal, near Goffs, in San Bernardino County, and two companies at one time did considerable development work in the endeavor to open up paying quantities. Some ore carrying lead vanadate has been developed in the 29 Palms, or Washington district, on the line between Riverside and San Bernardino counties, but no shipments reported.

The principal use of vanadium is as an alloy in steels, especially in tool steel, and in those varieties where resistence to repeated strains is required. Present (July 17, 1941) New York quotations for ferrovanadium are $2.70-$2.90 per pound of vanadium f.o.b. works, and vanadium ore 27½¢ per pound V_2O_5 contained.

ZINC

Bibliography: State Mineralogist Reports XIV, XV, XVII, XVIII, XX-XXIV, XXVI, XXVII, XXX, XXXIII-XXXV (inc.), Bulletins 38, 67, 91.

The recoverable zinc mined in California during 1940 amounted to 182,088 pounds valued at $11,472, compared with 16,390 pounds worth

[1] U. S. G. S. Bull. 652, p. 32.

$852 in 1939. The 1940 output came from properties in Inyo and Orange counties.

The zinc ores of Shasta and Calaveras counties are associated with copper, while those of Inyo, Los Angeles, and San Bernardino are associated principally with lead-silver and zinc-silver ores.

The output of metallic zinc[1] at reduction plants in the United States during 1940 amounted to 724,192 short tons valued at $91,248,000, of which 85,287 tons were reduced from foreign ores, and 48,917 tons from secondary metal. The 1940 output was an increase in both amount and value compared with that of 1939, which was 557,664 short tons worth $57,997,000.

The average price per pound for zinc in 1940 was 6.3¢ compared with 5.2¢ in 1939, 4.8¢ in 1938, 6.5¢ in 1937, 5¢ in 1936, and 4¢ in 1935.

Total Zinc Production of California.

Total figures for zinc output of the State are as follows, commercial production dating back only to 1906:

Year	Pounds	Value	Year	Pounds	Value
1906	206,000	$12,566	1924	3,060,000	$198,900
1907	177,759	10,598	1925	11,546,602	877,542
1908	54,000	3,544	1926	20,447,559	1,533,568
1909			1927	8,625,004	552,000
1910			1928		
1911	2,679,842	152,751	1929		
1912	4,331,391	298,866	1931	149,865	5,314
1913	1,157,947	64,845	1932		
1914	399,641	20,381	1933	290,222	12,189
1915	13,043,411	1,617,383	1934	721,719	31,034
1916	15,950,565	2,137,375	1935	328,013	14,432
1917	11,854,804	1,209,190	1936	29,740	1,487
1918	5,565,516	506,466	1937	39,643	2,577
1919	1,384,192	101,046	1938	17,554	843
1920	1,188,009	96,229	1939	16,390	852
1921	846,184	42,309	1940	182,088	11,472
1922	3,034,430	172,963			
1923			Totals	107,328,138	$9,688,722

[1] U. S. Bureau of Mines, Mineral Market Report 907, April 25, 1941.

CHAPTER FOUR

STRUCTURAL MATERIALS

Bibliography: State Mineralogist Reports XII-XXXVII (inc.). Bulletin 38. Spurr and Wormser, "Marketing of Metals and Minerals." "Non-Metallic Minerals," by R. B. Ladoo. "Industrial Minerals and Rocks," A. I. M. E., 1937. See also under each substance.

As indicated by this subdivision heading, the mineral substances herein considered are those more or less directly used in building and structural work. California is independent, so far as these are concerned, and almost any reasonable construction can be made with materials produced in the State. Chromite, which previous to 1933 was listed under structural materials in the statistical reports of the State Division of Mines, is now transferred to the metals group, thus coinciding with the practice of the United States Bureau of Mines.

This branch of the mineral industry for 1940 was valued at $34,739,419, as compared with a total of $30,373,840 for 1939. Materials grouped under this classification showing increased values in 1940 were cement, granite, lime, magnesite, marble, sandstone, miscellaneous stone, and paving blocks.

In 1940 all counties but one contributed to the structural materials total. There is not a county in the fifty-eight counties of the State which is not capable of producing at least one of the materials under the classification.

The following summary shows the value of the structural materials produced in California during the years 1939-1940, with increases or decreases in each instance:

Substance	1939		1940		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Bituminous rock	16,546 tons	$63,612	*	*	* —
Brick and hollow building tile		3,063,660		$2,762,885	300,775—
Cement	10,984,033 bbls.	15,616,219	13,955,255 bbls.	17,673,202	2,056,983 +
Granite		145,194		198,896	53,702+
Lime	87,288 tons	849,122	101,395 tons	902,322	53,200+
Marble[a]		14,822		15,289	467+
Sandstone		12,494		13,083	589+
Slate	5,777 tons	28,327	4,777 tons	18,031	10,296—
Stone, miscellaneous	18,681,305 tons	10,316,787		12,181,564	1,864,777+
Unapportioned		[b]263,603		[c]974,147	710,544+
Total values		$30,373,840		$34,739,419	
Net decrease					$4,365,579

[a] Includes onyx and travertine.
[b] Includes magnesite, tube-mill pebbles, and paving blocks.
[c] Includes bituminous rock, magnesite, tube-mill pebbles, and paving blocks.

ASPHALT

Bibliography: State Mineralogist Reports VII, X, XII-XV (inc.), XVII, XVIII. Bulletins 16, 32, 63, 67, 69, 91, 118.

Asphalt was for a number of years accounted for in the statistical reports by the State Mining Bureau, because in the early days of the

oil industry, considerable asphalt was produced from outcroppings of oil sand, and was a separate industry from the production of oil itself. However, at the present time most of the asphalt comes from the oil refineries, which produce a better and more uniform grade; hence, its value is not now included in the mineral total, as to do so would be in part a duplication of the crude petroleum figures. Such natural asphalt as is at present mined is in the form of bituminous sandstones, and is recorded under that designation.

BITUMINOUS ROCK

Bibliography: State Mineralogist Reports XII, XIII, XV, XVII, XVIII, XXI, XXII, XXV, XXVI, XXXI.

This material is essentially an uncemented sandstone which is saturated with and held together by a natural asphaltic constituent, probably the residue from the evaporation of a crude petroleum deposit. Bituminous rock is still used to a limited extent for road dressing in those districts adjacent to available deposits, though the manufacture of asphalt at the oil refineries has almost entirely superceded the direct use of the native material. Some of the Santa Cruz County production is put on the market as a material which can be laid cold. This material is especially applicable and valuable for patch jobs.

During 1940 the output of bituminous rock in California came from a single property each in Santa Barbara and Santa Cruz counties; the annual details are concealed under the 'Unapportioned' item so as not to reveal the output of either operator. The 1940 production showed a decrease in amount and value as compared with that of 1939 which was 16,549 tons valued at $63,612.

Bituminous Rock Production of California, by Years.

The following tabulation shows the total amount and value of bituminous rock quarried and sold in California, from the records compiled by the State Mining Bureau, annually since 1887:

Year	Tons	Value	Year	Tons	Value
1887	36,000	$160,000	1915	17,789	$61,468
1888	50,000	257,000	1916	19,449	66,561
1889	40,000	170,000	1917	5,590	18,580
1890	40,000	170,000	1918	2,561	9,067
1891	39,962	154,164	1919	4,614	18,537
1892	24,000	72,000	1920	5,450	27,825
1893	32,000	192,036	1921	8,298	43,192
1894	31,214	115,193	1922	4,624	13,570
1895	38,921	121,586	1923	2,945	11,780
1896	49,456	122,500	1924	6,040	14,922
1897	45,470	128,173	1925	2,681	10,724
1898	46,836	137,575	1926	3,863	21,577
1899	40,321	116,097	1927	3,515	17,704
1900	25,306	71,495	1928	4,966	33,832
1901	24,052	66,354	1929	3,320	14,360
1902	33,490	43,411	1930	8,525	36,075
1903	21,944	53,106	1931		
1904	45,280	175,680	1932	* 23,653	109,140
1905	24,753	60,436	1933		
1906	16,077	45,204	1934	* 36,793	130,301
1907	24,122	72,835	1935		
1908	30,718	109,818	1936	* 41,681	133,344
1909	34,123	116,436	1937		
1910	87,547	165,711	1938	* 36,128	139,242
1911	75,125	117,279	1939	16,546	63,612
1912	44,073	87,467	1940	*	*
1913	37,541	78,479			
1914	66,119	166,618	Totals	1,363,481	$4,342,066

* Annual details concealed under 'Unapportioned.'

BRICK AND HOLLOW TILE

Bibliography: State Mineralogist Reports VIII, X, XII-XV (inc.), XVII-XXVIII (inc.), XXXII. Bulletins 38, 99. Preliminary Report No. 7. Cal. Jour. of Development, June, 1925, pp. 5-6.

Bricks of many varieties and in important quantities are annually produced in California, as might be expected in a state with such diversified and widespread mineral resources. The varieties include common, fire, pressed, glazed, enamel, fancy, vitrified, sand-lime, and others. Not only do the plants here supply practically all of our own requirements in these products, but considerable quantities are shipped to contiguous territory and certain products are shipped over a much wider radius. We also include under this heading the various forms of hollow building 'tile' or blocks.

During 1940 the output of all kinds of brick showed a decrease in value of 12 per cent and in amount of 14 per cent as compared with that of 1939, while the production of hollow building tile showed an increase in amount and value over the previous year. The 1940 production consisted of 106,235 M of common brick valued at $1,219,166; 17,992 M of fire and refractory brick valued at $1,069,023; 5,642 M of glazed, pressed, fancy, and vitrified brick valued at $191,266; and 29,048 tons of hollow building tile valued at $283,430; which gave a total value for the year for brick and hollow tile at $2,762,885. The 1939 output had a total value of $3,063,660. The 1940 output came from 42 plants in 18 counties.

As for several years past Los Angeles County had the largest production of brick and hollow tile in 1940 with 16 companies producing 50,188 M of common brick worth $603,117; 7,486 M of fire brick worth $536,687; 1,250 M of glazed, pressed, and fancy brick worth $47,236; and 3,446 tons of hollow building tile worth $32,238.

Contra Costa County next with three plants operating had an output of brick and hollow tile worth $607,358; followed by Alameda County with three plants with an output worth $179,613. There were two plants operating each in Kern, Sacramento, San Diego, and San Joaquin counties and one each in Amador, Fresno, Humboldt, Orange, Placer, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, Santa Clara, and Tulare counties.

Brick and Hollow-Tile Production of California, by Years.

Record of brick production in the state has been kept since 1893 by this Bureau, the figures for hollow building 'tile' or blocks being also included since 1914. The annual and total figures, for amount and value, are given in the following table:

Year	Brick, M	Hollow building blocks, tons	Value
1893	103,900		$801,750
1894	81,675		457,125
1895	131,772		672,360
1896	24,000		524,740
1897	97,468		563,240
1898	100,102		571,362
1899	125,950		754,730
1900	137,191		905,210
1901	130,766		860,488
1902	169,851		1,306,215
1903	214,403		1,999,546
1904	281,750		1,994,740
1905	286,618		2,273,786
1906	277,762		2,538,848
1907	362,167		3,438,951
1908	332,872		2,506,495
1909	333,846		3,059,929
1910	340,883		2,934,731
1911	327,474		2,638,121
1912	337,233		2,940,290
1913	358,754		2,915,350
1914	270,791		2,288,227
1915	180,538		1,678,756
1916	206,960		2,096,570
1917	192,269	29,348	2,532,721
1918	136,374	34,818	2,363,481
1919	156,328	36,026	3,087,067
1920	245,842	99,208	5,704,393
1921	238,022	67,100	5,570,875
1922	374,853	105,909	7,994,991
1923	397,754	122,534	9,738,082
1924	456,716	114,469	9,137,908
1925	361,094	105,491	7,503,976
1926	388,048	90,332	7,026,124
1927	374,111	75,116	6,516,077
1928	272,443	66,277	5,694,770
1929	327,011	66,713	5,607,410
1930	267,019	68,047	4,205,460
1931	151,545	51,988	2,560,415
1932	90,683	27,098	1,605,086
1933	76,905	25,814	1,520,481
1934	66,738	17,534	1,644,661
1935	76,521	21,309	1,855,343
1936	131,667	16,081	2,240,905
1937	148,833	17,521	3,083,902
1938	129,273	16,592	2,594,546
1939	150,503	16,283	3,063,660
1940	129,887	29,048	2,762,885
Totals	10,855,165	1,320,656	$148,436,779

CEMENT

Bibliography: State Mineralogist Reports VIII, IX, XII, XIV, XV, XVII, XVIII, XXI-XXVIII (inc.), XXXII. Bulletin 38.

During 1940 there was produced in California 13,955,255 barrels of cement valued at $17,673,202 f.o.b. plant; of which 6,948,383 barrels came from northern California plants and 7,006,872 barrels from southern California plants. The 1940 output showed an increase in both amount and value as compared with that of 1939, which was 10,984,033 barrels worth $15,616,219.

Shipments during 1940 were made by eleven plants in ten counties to the extent of 13,545,306 barrels valued at $17,195,105, as com-

pared with 11,219,575 barrels valued at $16,015,655 in 1939. In 1940 there were six plants operating in northern California—one each in Calaveras, Contra Costa, Merced, San Mateo, Santa Clara, and Santa Cruz counties, which shipped 6,534,395 barrels of cement; and five plants in southern California—two in San Bernardino County, and one each in Kern, Los Angeles,[1] and Riverside counties, which shipped 7,010,911 barrels of cement. There was an average of 2,213 men employed in the above cement mills during 1940. The annual capacity of California cement mills [2] in 1939 was 25,280,000 barrels compared with 22,820,000 barrels for 1938.

Photo by Walter W. Bradley

Cement plant of Permanente Corporation, near Los Altos, Santa Clara County. Supplying cement for Shasta Dam.

Cement (portland) is a manufactured product made from several minerals and is a calcined mixture of limestone (one California mill using oyster shells), shale, or clay, and a small amount of gypsum; with some special cements using diatomite, bentonite, silica, iron ore, etc. Wherever possible the crude material used in the manufacture of cement is not included with the total of amount and value of the mineral in this report to avoid duplication in values.

Cement Production of California, by Years.

'Portland' cement was first commercially produced in California in 1891; though in 1860 and and for several years following, a natural hydraulic cement from Benicia was utilized in building operations in San Francisco.

"The Benicia Cement Company in 1859-60 was turning out 50 to 100 barrels of cement a day and San Francisco was using about 12,000 barrels a year. The mill price of the product was then $4 a barrel. By 1865, the San Francisco rate of consumption had increased to 100,000

[1] The plant in Los Angeles County grinds clinker coming from other counties, therefore the crude material is credited to the point of origin.

[2] U. S. Bureau of Mines, Mineral Yearbook, 1940, p. 1134.

barrels yearly, brick buildings largely taking the place of frame structures, and the price of cement had fallen to $2.50 a barrel, about the same as it is today.''[1]

The growth of the industry became rapid after 1902; since which time cement has continued to be an important factor in the industrial life of the State. Although the total cement figures, to date, are not of the same magnitude as those for gold and petroleum, it is interesting to note that the value of California's cement yield in the period 1920-1931 annually exceeded the value of her gold output.

Cement Production of California, by Years

Year	Barrels	Value	Year	Barrels	Value
1891	5,000	$15,000	1917	5,790,734	$7,544,282
1892	5,000	15,000	1918	4,772,921	7,969,909
1893			1919	4,645,289	8,591,990
1894	8,000	21,600	1920	6,709,160	14,962,945
1895	16,383	32,556	1921	7,404,221	18,072,120
1896	9,500	28,250	1922	8,962,135	16,524,056
1897	18,000	66,000	1923	10,825,405	25,999,203
1898	50,000	150,000	1924	11,655,131	23,225,850
1899	60,000	180,000	1925	13,206,630	25,043,335
1900	52,000	121,000	1926	13,797,173	25,269,678
1901	71,800	159,842	1927	14,661,783	26,474,935
1902	171,000	423,600	1928	13,625,231	24,463,287
1903	640,868	968,727	1929	12,794,729	21,038,565
1904	969,538	1,539,807	1930	9,831,938	14,575,731
1905	1,265,553	1,791,916	1931	7,693,712	11,510,655
1906	1,286,000	1,941,250	1932	5,657,549	7,967,107
1907	1,613,563	2,585,577	1933	7,284,031	10,331,395
1908	1,629,615	2,359,692	1934	8,936,085	12,445,616
1909	3,779,205	4,969,437	1935	8,086,292	10,120,721
1910	5,453,193	7,485,715	1936	13,300,188	18,314,589
1911	6,371,369	9,085,625	1937	12,072,062	16,546,229
1912	6,198,634	6,074,661	1938	10,561,037	15,502,574
1913	6,167,806	7,743,024	1939	10,984,033	15,616,219
1914	5,109,218	6,558,148	1940	13,955,255	17,673,202
1915	4,918,275	6,044,950			
1916	5,299,507	6,210,293	Totals	288,381,751	$462,355,853

GRANITE

Bibliography: State Mineralogist Reports X, XII-XXVI (inc.), XXVIII, XXXI, XXXV-XXXVI. Bulletin 38.

The 1940 granite output in California amounted to 14,480 cu. ft. of building stone valued at $92,710; 21,721 cu. ft. of monumental stone valued at $91,404; 1,540 linear ft. of curbing valued at $2,230; and 35,308 cu. ft. of unclassified material including some tuff, volcanic rock and a small amount of mica schist, which was used as building material and flagstone, having a value of $12,552; and giving a total value for the years yield at $198,896. This was an increase over the 1939 value which was $145,194. The 1940 output came from 16 quarries in 12 counties, of which three quarries were in San Diego County; two each in Placer and Sonoma counties; and one each in Fresno, Lassen, Los Angeles, Nevada, Riverside, Sacramento, San Bernardino, and Ventura counties.

The material from Los Angeles was a mica schist; that from Sonoma County, a tuff; and that from Ventura County, a volcanic rock.

So far as possible, granite production has been segregated in the statement herewith into the various uses to which the product was put.

[1] Monthly Review of Mercantile Trust Co. of Calif., Vol. XIII, No. 3, p. 55, Mar. 1924.

It will be noted, however, that a portion of the output has been entered under the heading 'Unclassified.' This is necessary because of the fact that some of the producers have no way of telling to what specific use their stone was put after they had quarried and sold the same in the rough.

Varieties.

For building purposes, the granite found in California, particularly the varieties from Raymond in Madera County, Rocklin in Placer County and near Porterville in Tulare County, are unexcelled by any similar stone found elsewhere. The quantities available, notable at Raymond and Porterville, are unlimited. Most of California's 'granite,' particularly that found in the Sierra Nevada Mountains, is technically 'granodiorite' (that is, both plagioclase and orthoclase feldspars are present).

Granites of excellent quality for building and ornamental purposes are also quarried in Riverside, San Bernardino, and San Diego counties. Near Lakeside, San Diego County, there is a fine-grained, 'silver gray' granite of uniform texture and color, especially suited for monumental and ornamental work.

The Fresno County stone is a dark, hornblende diorite, locally called 'black granite,' whose color permits of a fine contrast of polished and unpolished surfaces, making it particularly suitable for monumental and decorative purposes. There is also similar 'black granite' in Tulare County, near Success.

Granite Production of California, by Years.

The value of granite produced, annually, since 1887 has been as follows:

Year	Value	Year	Value
1887	$150,000	1915	$227,928
1888	57,000	1916	535,339
1889	1,329,018	1917	221,997
1890	1,200,000	1918	139,861
1891	1,300,000	1919	220,743
1892	1,000,000	1920	495,732
1893	531,322	1921	725,901
1894	228,816	1922	676,643
1895	224,329	1923	760,081
1896	201,004	1924	1,211,046
1897	188,024	1925	1,853,859
1898	147,732	1926	655,332
1899	141,070	1927	1,398,443
1900	295,772	1928	763,996
1901	519,285	1929	1,169,271
1902	255,239	1930	855,477
1903	678,670	1931	636,741
1904	467,472	1932	398,676
1905	353,837	1933	183,706
1906	344,083	1934	249,083
1907	373,376	1935	339,917
1908	512,923	1936	244,243
1909	376,834	1937	207,738
1910	417,898	1938	131,386
1911	355,742	1939	145,194
1912	362,975	1940	198,896
1913	981,277		
1914	628,786	Total	$28,269,713

LIME

Bibliography: State Mineralogist's Reports XIV, XV, XVII-XXIX (inc.), XXXIII-XXXV (inc.), Bulletin 38.

The output of lime in California during 1940 amounted to 101,395 short tons valued at $902,322, and came from two plants each in El Dorado and San Bernardino counties; and one plant each in Alameda, Santa Clara, Santa Cruz, and Tuolumne counties. The above figures showed an increase in amount and value over those of 1939, which were 87,288 tons worth $849,122. The 1940 totals were the largest of any annual output on record for California.

So far as we have been able to segregate the data, these figures include mainly only such lime as is used in building operations; though they do include a small proportion of calcined lime employed in agriculture and the chemical industries, the figures for which were not separable. A portion is hydrated lime. Limestone utilized in sugar making, for smelter flux, as a fertilizer, and other special industrial uses, is classified under 'Industrial Materials.' That consumed in cement manufacture is included in the value of cement.

Lime Production of California, by Years.

The following tabulation gives the amounts and value of lime produced in California by years since 1894 when compilation of such records was begun by the State Mining Bureau. The figures for quantity have been recalculated from 'barrels,' as shown in the earlier reports, to 'tons' for the years 1894-1922 (inc.):

Year	Tons	Value	Year	Tons	Value
1894	37,350	$318,700	1919	42,070	$552,043
1895	39,776	386,094	1920	46,314	557,232
1896	30,275	261,505	1921	46,353	610,619
1897	28,780	252,900	1922	57,875	671,747
1898	29,786	254,010	1923	70,894	788,834
1899	29,985	314,575	1924	62,029	703,355
1900	31,252	283,699	1925	61,922	685,528
1901	31,738	334,688	1926	63,568	670,837
1902	44,866	369,616	1927	60,498	631,497
1903	49,659	418,280	1928	56,616	547,919
1904	57,945	571,749	1929	42,834	417,101
1905	61,700	555,322	1930	47,662	452,084
1906	68,927	763,060	1931	36,189	360,523
1907	68,422	756,376	1932	27,510	254,223
1908	39,639	379,243	1933	33,425	271,619
1909	52,075	577,824	1934	32,500	309,765
1910	47,951	477,683	1935	59,731	573,212
1911	42,959	390,988	1936	64,275	633,678
1912	52,212	464,440	1937	69,532	681,277
1913	61,344	528,547	1938	70,578	683,403
1914	43,996	378,663	1939	87,288	849,122
1915	35,653	286,304	1940	101,395	902,322
1916	49,364	390,475			
1917	50,073	311,380	Totals	2,370,569	$23,295,376
1918	43,684	461,315			

MAGNESITE

Bibliography: State Mineralogist Reports XII-XV (inc.), XVII-XXVII (inc.), XXX, XXXI, XXXIV, XXXVI. Bulletins 38, 79, 91. U. S. Geol. Surv., Bulletins 355, 540. Min. Res. 1913, Pt. II, pp. 450-453. Min. & Sci. Press, Vol. 114, p. 237. "Magnesite"—Hearings before Comm. on Ways and Means, House of Repr., on H. R. 5218, June 16, 17, and July 17, 1919. Eng.

Soc. W. Penn., Proc. 1913, Vol. 29, pp. 305-388, 418-444. Eng. & Min. Jour.-Pres., Vol. 114, July 29, and Dec. 2, 1922. U. S. Tariff Comm., "Crude and Caustic Calcined Magnesite. A Preliminary Statement of Information," May 19, 1926.

The production of crude magnesite in California during 1940 came from a single property each in Imperial, Santa Clara, and Stanislaus counties, and included from Alameda County magnesium carbonate reduced from bittern waters from salt works and burnt as magnesite. All but the Imperial County material was produced by one company, therefore the annual details are concealed under the 'Unapportioned' item so as not to reveal their output. Practically all was shipped in the calcined form.

The 1940 output was the largest in the last twenty years. The 1938-1939 production showed a total of 47,954 short tons of crude magnesite valued at $375,005, of which only a small amount was sold as such. Most of this material was calcined before being marketed. The operators reports showed that a total of 36,758 short tons of calcined material valued at $987,370, rail-shipping point, was made during 1938-1939 and was both deadburned for refractories and material for the plastic trade.

In California the known deposits are mostly in the metamorphic rocks of the Coast Ranges and the Sierra Nevada, being associated with serpentine areas. The notable exceptions are the sedimentary deposits at Bissell in Kern County and at Afton in San Bernardino County. Several thousand tons have been shipped from the Bissell deposit; and small shipments have been made from the Afton property. Beginning in 1938, a portion of the market for calcined magnesite is being supplied by magnesium oxide produced from salt-works bitterns at a plant at Newark, Alameda County, on San Francisco Bay. The figures for the crude of above tonnage are included under those for magnesium salts in the Salines chapter.

Imports.

The tariff act of 1930 placed the following import duties on magnesite: Crude magnesite 15/32¢ per lb., caustic calcined magnesite 15/16¢ per lb., dead-burned and grain magnesite, not suitable for manufacture into oxychloride cements, 23/40¢ per lb.; magnesite brick, ¾¢ per lb., and 10 percent ad valorem. The figures of imports for 1939, as published by the U. S. Bureau of Foreign and Domestic Commerce, show a total of 47,206 short tons valued at $858,004 as compared with 26,479 short tons worth $376,397 in 1938.

Total Magnesite Production of California.

The first commercial production of magnesite in California was made in the latter part of 1886 from the Cedar Mountain district,[1] southeast of Livermore, Alameda County. Shipments amounting to 'several tons' or 'several carloads' were sent by rail to New York; but there is apparently no exact record of the amount for that first year. The statistical records of the State Mining Bureau began with the year 1887, and the table herewith shows the figures for amount

[1] See U. S. Geol. Surv.; Mineral Resources of U. S., 1886, pp. 6 and 696.

and value, annually, from that time. Shipments of magnesite from Napa County began in 1891 from the Snowflake Mine; from the Red Mountain deposits in Santa Clara County, in 1899; and from Tulare County in 1900.

Total Magnesite Production of California

Year	Tons	Value	Year	Tons	Value
1887	600	$9,000	1915	30,271	$283,461
1888	600	9,000	1916	154,052	1,311,893
1889	600	9,000	1917	209,648	1,976,227
1890	600	9,000	1918	83,974	803,492
1891	1,500	15,000	1919	44,696	452,094
1892	1,500	15,000	1920	83,695	1,033,491
1893	1,093	10,930	1921	47,837	511,102
1894	1,440	10,240	1922	55,637	594,665
1895	2,200	17,000	1923	73,963	946,643
1896	1,500	11,000	1924	67,236	900,183
1897	1,143	13,671	1925	64,623	872,944
1898	1,263	19,075	1926	50,915	587,642
1899	1,280	18,480	1927	46,093	577 887
1900	2,252	19,333	1928	45,645	501,590
1901	4,726	43,057	1929	47,269	488,014
1902	2,830	20,655	1930	38,681	388,472
1903	1,361	20,515	1931	21,576	182,283
1904	2,850	9,298	1932	* 40,303	282,325
1905	3,933	16,221	1933		
1906	4,032	40,320	1934	* 62,509	413,228
1907	6,405	57,720	1935		
1908	10,582	80,822	1936	* 94,491	734,443
1909	7,942	62,588	1937		
1910	16,570	113,887	1938	* 47,954	375,005
1911	8,858	67,430	1939		
1912	10,512	105,120	1940	*	*
1913	9,632	77,056			
1914	11,438	114,380	Totals	1,530,760	$15,231,882

* Combined under 'Unapportioned.'

MARBLE

Bibliography: State Mineralogist Reports XII-XV (inc.), XVII-XXX (inc.), XXXIV, XXXV. Bulletin 38. U. S. Bur. of Mines Bull. 106.

The 1940 production of marble in California was valued at $15,189 (including some onyx and travertine from Solano County, and a small amount of limestone used as building stone and flagstone coming from a single operator each in Los Angeles and Santa Barbara counties). The marble came from a single quarry each in San Bernardino and Tuolumne counties. The 1940 output showed an increase in value over that of 1939 which was $14,822.

California has many beautiful and serviceable varieties of marble, suitable for almost any conceivable purpose of construction or decoration. In the decorative class are deposits of onyx marble of beautiful coloring and effects. There is also serpentine marble suitable for electrical switchboard use.

Marble Production of California, by Years.

Data on annual production since 1887, as compiled by the State Mining Bureau, follows. Previous to 1894 no records of amounts were preserved.

Total Production of Marble in California, by Years

Year	Cubic feet	Value	Year	Cubic feet	Value
1887		$5,000	1915	22,186	$41,518
1888		5,000	1916	25,954	50,280
1889		87,030	1917	24,755	62,950
1890		80,000	1918	[a]17,428	49,898
1891		100,000	1919	25,020	74,482
1892		115,000	1920	[b]29,531	92,899
1893		40,000	1921	30,232	98,395
1894	38,441	98,326	1922	38,321	127,792
1895	14,864	56,566	1923	28,015	124,919
1896	7,889	32,415	1924	[b]61,579	140,253
1897	4,102	7,280	1925	35,664	116,105
1898	8,050	23,594	1926	34,806	119,999
1899	9,682	10,550	1927	[b]42,308	103,689
1900	4,103	5,891	1928	[b]34,324	82,190
1901	2,945	4,630	1929	[b]72,881	93,661
1902	19,305	37,616	1930	[b]65,775	82,194
1903	84,624	97,354	1931	[b]37,776	81,760
1904	55,401	94,208	1932	[b]25,506	42,505
1905	73,303	129,450	1933	[b]9,039	23,178
1906	31,400	75,800	1934	[b]7,185	10,759
1907	37,512	118,066	1935	(b)	9,884
1908	18,653	47,665	1936	(b)	23,011
1909	79,600	238,400	1937	(b)	23,667
1910	18,960	50,200	1938	(a) (b)	6,015
1911	20,201	54,103	1939	(b)	14,822
1912	27,820	74,120	1940	(b)	15,189
1913	41,654	113,282			
1914	25,436	48,832	Total value		$3,553,392

[a] Includes onyx and serpentine.
[b] Includes onyx and travertine.

ONYX and TRAVERTINE

Bibliography: State Mineralogist Reports XII-XV (inc.), XVII, XVIII, XXI, XXIII, XXXI, XXXIV. Bulletin 38.

Onyx and travertine are known to exist in a number of places in California, but there has been only a small and irregular production since the year 1896. In 1940 there was one producer of onyx in Solano County. The 1940 output showed an increase in both quantity and value over that of 1939, the figures of which are combined with marble. This material is used in terrazzo, auto gear-shift handles, bases for fountain-pen sets, and other ornamental purposes.

Onyx Production of California, by Years.

Production by years has been as follows:

Year	Value	Year	Value
1887	*	1925	$16,120
1888	$900	1926	7,575
1889	900	1927	*
1890	900	1928	*
1891	1,500	1929	*
1892	2,400	1930	*
1893	1,800	1931	*
1894	27,000	1932	*
1895	20,000	1933	*
1896	12,000	1934	*
1918	24,000	1935	*
1919	*	1936	*
1920		1937	*
1921	1,294	1938	*
1922	3,320	1939	*
1923	2,510	1940	*
1924	*		
		Total value	$122,219

* See under Marble.

SANDSTONE

Bibliography: State Mineralogist Reports XII-XV, XVII, XVIII, XXI, XXIII, XXVI-XXVIII (inc.), XXXIV, XXXV. Bulletin 38. U. S. Bur. of Mines, Bull. 124.

An unlimited amount of high-grade sandstone is available in California, but the wide use of concrete in buildings of every character, as well as the popularity of a lighter-colored building stone, has curtailed production in this branch of the mineral industry during recent years almost to the vanishing point. In 1940 there was a total of 27,992 cu. ft. of sandstone valued at $13,038 at the quarry, produced in California, and came from two properties in Monterey County and one each in Colusa, Los Angeles, Napa, Riverside, San Luis Obispo, and Shasta counties.

Practically all of the material was flagstone which is used in garden walks, fountains, walls and fireplaces to give effect to Spanish and English types of homes. The material reported from Monterey and San Luis Obispo counties is in reality an indurated shale of the Monterey series, of a cream color and utilized as a building stone. Part of the material coming from Los Angeles County was schist and indurated shale.

Sandstone Production of California, by Years.

Amount and value, so far as contained in the records of this Bureau, are presented herewith, with total value from 1887 to date:

Year	Cubic feet	Value	Year	Cubic feet	Value
1887		$175,000	1915	63,350	$8,438
1888		150,000	1916	17,270	10,271
1889		175,598	1917	31,090	7,074
1890		100,000	1918	900	400
1891		100,000	1919	5,400	3,720
1892		50,000	1920	10,500	2,300
1893		26,314	1921	10,150	2,112
1894		113,592	1922	900	1,100
1895		35,373	1923	7,000	13,000
1896		28,379	1924	6,700	3,600
1897		24,086	1925	14,704	14,362
1898		46,384	1926	34,100	17,500
1899	56,264	103,384	1927	222,900	205,400
1900	378,468	254,140	1928	134,100	43,250
1901	266,741	192,132	1929	177,655	49,881
1902	212,123	142,506	1930	160,704	56,404
1903	353,002	585,309	1931	110,244	30,960
1904	363,487	567,181	1932	41,793	13,286
1905	302,813	483,268	1933	25,980	10,888
1906	182,076	164,068	1934	21,738	14,245
1907	159,573	148,148	1935	38,426	9,268
1908	93,301	55,151	1936	24,705	9,180
1909	79,240	37,032	1937	73,190	15,680
1910	165,971	80,443	1938	43,107	9,384
1911	255,313	127,314	1939	54,380	12,494
1912	66,487	22,574	1940	27,992	13,083
1913	62,227	27,870			
1914	111,691	45,322	Total value		$4,637,748

SERPENTINE

Bibliography: State Mineralogist Report XV. Bulletin 38.

Serpentine has not been produced in California to a very large extent at any time. A single deposit, that on Santa Catalina Island, has yielded the principal output to date. Some material was shipped

from there in 1917 and 1918, being the only output recorded since 1907. It was used for decorative building purposes and for electrical switchboards. As there was but a single operator, the figures were combined with those of marble output for those years.

The production of serpentine prior to 1919 was 'verde antique' which is used as an ornamental stone and often classed as a marble. In recent years experimental tests have proved several possible commercial applications to which this mineral might be put such as an admix in cement, in the manufacture of magnesium chemicals, in terrazzo, as a substitute for soapstone, and as a filler. During 1938 there was a small shipment of serpentine from one property in San Bernardino County. The annual details are concealed in the 'Unapportioned' item so as not to reveal the output of an individual.

Serpentine Production of California, by Years.

The following table shows the amount and value of serpentine from 1895 as recorded by this bureau:

Serpentine Production in California, by Years

Year	Cubic feet	Value	Year	Cubic feet	Value
1895	4,000	$4,000	1905		
1896	1,500	6,000	1906	847	$1,694
1897	2,500	2,500	1907	1,000	3,000
1898	750	3,000	1917	[a]	[a]
1899	500	2,000	1918	[b]	[b]
1900	350	2,000	1919		
1901	89	890	1938	[a]	[a]
1902	512	5,065			
1903	99	800			
1904	200	2,310	Totals	12,347	$33,259

[a] Under 'Unapportioned.'
[b] See under Marble.

SLATE

Bibliography: State Mineralogist Reports XV, XVIII, XXIV, XXVIII, XXXIV. Bulletin 38. U. S. Geol. Surv., Bull. 586. U. S. Bur. of Mines, Bull. 218.

Slate was first produced in California in 1889. Up to and including 1910 such production was continuous, but since then it has been irregular. Large deposits of excellent quality are known in the State, especially in El Dorado, Calaveras and Mariposa counties, but the demand has been light owing principally to competition of cheaper roofing materials.

The production of slate in California during 1940 amounted to 4,777 short tons, having a total value of $18,031 f.o.b. quarry and came from properties in El Dorado, Los Angeles, and Tuolumne counties. The 1940 figures showed a decrease in both amount and value over those of 1939 which were 5,777 tons at $28,329. Practically all the slate was crushed and used for roofing granules. The slate from Los Angeles County was sold as flagstones.

Total Production of Slate in California.

A complete record of amount and value of slate produced in California follows:

Year	Squares	Value	Year	Squares	Value
1889	4,500	$18,089	1915	1,000	$5,000
1890	4,000	24,000	1916		
1891	4,000	24,000	1920	8	80
1892	3,500	21,000	1921		
1893	3,000	21,000	1922	200	2,400
1894	1,800	11,700	1923		
1895	1,350	9,450	1926	[a]	7,371
1896	500	2,500	1927	[b]2,686	17,960
1897	400	2,800	1928	[b]4,075	31,263
1898	400	2,800	1929		
1899	810	5,900	1930	[*] [b]8,220	71,347
1900	3,500	26,250	1931		
1901	5,100	38,250	1932	[*] [b]8,234	55,182
1902	4,000	30,000	1933	[b]5,343	31,958
1903	10,000	70,000	1934	[b]5,065	24,245
1904	6,000	50,000	1935	[a]	40,912
1905	4,000	40,000	1936	[a]	49,818
1906	10,000	100,000	1937	[a]	32,572
1907	7,000	60,000	1938	[b]6,871	30,281
1908	6,000	60,000	1939	[b]5,777	28,327
1909	6,961	45,660	1940	[b]4,777	18,031
1910	1,000	8,000			
1911			Total value		$1,123,146

[*] Annual details concealed under 'Unapportioned.'
[a] Quantity not shown as both 'squares' and 'tons' included.
[b] Tons.

MISCELLANEOUS STONE

Bibliography: State Mineralogist Reports XII-XXVIII (inc.), XXXI-XXXII, XXXV. Bulletin 38; also annual statistical bulletins from 1915 to date.

'Miscellaneous stone' is the name used throughout this report as the title for that branch of the mineral industry covering crushed rock of all kinds, paving blocks, sand and gravel, and pebbles for grinding mills. The foregoing are very closely related from the standpoint of the producer; therefore it has been found to be most satisfactory to group these items as has been done in recent reports of this Bureau. So far as it has been possible to do so, crushed rock production has been subdivided into the various uses to which the product was put. It will be noted, however, a very large percentage of the output has been tabulated under the heading 'Unclassified.' This is necessary because of the fact that many of the producers have no way of telling to what specific use their rock was put (or at least the proportions to each use) after they have quarried and sold the same to distributors and contractors.

In addition to amounts produced by commercial firms, both corporations and individuals, there is hardly a county in the State but uses more or less gravel and broken rocks on its roads. Of much of this, particularly in the country districts, there is no definite record kept.

During 1940 there was a total value of $12,181,564 for 'miscellaneous stone,' as compared with a total value of $10,316,787 in 1939. As in the past Los Angeles County led in annual output of these products, its 1940 yield being worth $3,569,457; Alameda County second with an output worth $1,559,545; Shasta County third with an output worth $782,172; followed in turn by San Diego, Napa, Riverside, San

Benito, Kern, Sacramento, Contra Costa, Santa Clara, and Sonoma counties.

Paving Blocks.

The 1940 output of paving blocks in California was the largest since 1917 and came from a single property each in Riverside and Sacramento counties. The annual details are concealed under the 'Unapportioned' item so as not to reveal production of either operator.

The paving block industry has decreased materially of recent years, practically to the vanishing point, because of the increased construction of smoother pavements demanded by motor vehicle traffic. The blocks made in Solano County were of basalt; those from Sonoma are of basalt, andesite, and some trachyte, while those from Madera, Placer, Riverside, San Bernardino, and San Diego are of granite; and those from San Mateo County a sandstone.

The amount and value of paving block production, annually, since 1887 has been as follows:

Year	Amount M	Value	Year	Amount M	Value
1887	*10,000	$350,000	1914	6,053	$270,598
1888	10,500	367,500	1915	3,285	171,092
1889	7,303	297,236	1916	1,322	54,362
1890	7,000	245,000	1917	938	38,567
1891	5,000	150,000	1918	372	17,000
1892	*3,000	96,000	1919	27	1,350
1893	2,770	96,950	1920	63	3,155
1894	2,517	66,981	1921	4	280
1895	2,332	73,338	1922	72	3,924
1896	4,161	77,584	1923	15	880
1897	1,711	35,235	1924	11	935
1898	1,144	21,725	1925	27	1,350
1899	305	7,861	1926		
1900	1,192	23,775	1927	41	2,057
1901	1,920	41,075	1928	25	1,658
1902	3,502	112,437	1929		
1903	4,854	134,642	1930		
1904	3,977	161,752	1931 [a]	66	5,900
1905	3,408	134,347	1932		
1906	4,203	173,432	1934	2	75
1907	4,604	199,347	1935		
1908	7,660	334,780	1938		
1909	4,503	199,803	1939 [a]	9	439
1910	4,434	198,916	1940	[a]	[a]
1911	4,141	210,819			
1912	11,018	578,355	Totals	135,849	$5,326,071
1913	6,364	363,505			

* Figures for 1887-1892 (inclusive) are for Sonoma County only, as none are available for other counties during that period though Solano County quarries were then also quite active.

[a] Annual details concealed under 'Unapportioned.'

Grinding-Mill Pebbles.

The 1940 output of grinding-mill pebbles in California is combined under the 'Unapportioned' item to conceal the production of a single operator in San Diego County.

The amount and value of grinding-mill pebbles, annually, follows:

Year	Tons	Value	Year	Tons	Value
1915	340	$2,810	1929		
1916	20,232	107,567	1930 *	166	$1,225
1917	21,450	90,538	1931		
1918	8,628	61,268	1932 *	25	211
1919	2,607	19,272	1933		
1920	2,104	17,988	1934 *	300	3,018
1921	247	1,418	1935		
1922	1,571	7,628	1936 *	961	8,356
1923	2,650	14,936	1937		
1924	434	2,969	1938 *	960	4,800
1925	215	1,385	1939		
1926	102	612	1940 *	482	982
1927	288	1,800			
1928	372	2,408	Totals	64,134	$281,191

* Annual details concealed under 'Unapportioned.'

Sand and Gravel.

A considerable part of the gravel excavated is passed through grading and washing plants, and the material over 2 inches in size is crushed. Much of it is utilized in concrete mixtures. Most of the gravel used for road surfacing and repairs as well as that for railroad ballast is creek-run or pit-run material which is spread upon the roads without undergoing any grading or washing.

Photo by Walter W. Bradley

A section of the 9-mile conveyor belt transporting sand and gravel from Redding to the Shasta Dam, Shasta County.

The distribution of the 1940 output of sand and gravel by counties is given in the following table:

County	Sand and gravel	
	Tons	Value
Alameda[a]	2,014,976	$1,188,995
Amador	35,504	13,696
Butte	118,343	65,838
Calaveras	21,214	14,411
Colusa	167,635	41,909
Contra Costa[a]	216,091	154,372
Del Norte	22,020	17,800
El Dorado	3,914	1,480
Fresno	225,079	134,758
Glenn	61,666	16,891
Humboldt	242,030	105,825
Imperial	103,481	45,306
Inyo	37,760	41,579
Kern	256,682	194,437
Lake	71,292	27,883
Lassen	22,175	11,963
Los Angeles[b, c]	6,606,860	2,416,412
Madera	35,324	22,289
Mariposa	66,953	53,464
Mendocino	259,457	107,507
Merced	48,301	42,753
Modoc	49,600	27,825
Mono	73,211	37,322
Monterey[a, b, c]	244,291	219,482
Nevada	55,749	23,118
Orange	231,415	122,331
Placer	44,285	17,009
Plumas	20,310	10,155
Riverside[a, b, c]	241,418	146,583
Sacramento	381,303	191,612
San Bernardino	392,098	162,959
San Diego[a, b, c]	556,664	479,520
San Joaquin	240,573	139,189
San Luis Obispo	117,286	70,231
Santa Barbara	61,050	41,172
Santa Clara	163,650	80,137
Santa Cruz	254,509	136,004
Shasta	1,420,595	585,223
Siskiyou	36,330	23,567
Solano	29,084	9,695
Sonoma	394,953	197,798
Stanislaus	109,107	61,306
Tehama	3,240	1,880
Tulare	19,583	13,342
Tuolumne	2,300	880
Ventura[a]	258,352	118,543
Yolo	59,314	24,208
Yuba	105,714	71,890
Alpine, Kings, Marin, Napa, San Benito, San Mateo[a], Sierra, Trinity*	76,562	36,701
Totals	16,279,303	$7,769,250

* Combined to conceal the output of individual operators in each.
[a] Includes molding sand.
[b] Includes blast sand.
[c] Includes filter sand.

Included in the above is a total of 26,317 tons of molding sand valued at $100,917 coming from two properties in Contra Costa County; and one each in Alameda, Monterey, Riverside, Sacramento, San Diego, San Mateo, and Ventura counties. The 1940 yield showed an increase compared with that of 1939 which was 25,983 tons worth $53,890.

Crushed Rock.

To list the kinds and varieties of rock utilized commercially under this heading would be to run almost the entire gamut of the classification scale. Much depends on the kind available in a given district. Those which give the most satisfactory service are the basalts and other hard, dense, igneous rocks which break with sharp, clean edges. In many localities, river-wash boulders form an important source of such material. In such cases, combined crushing and washing plants obtain varying amounts of sand and gravel along with the crushed sizes. In Sacramento and Butte counties the tailings piles from the gold dredgers are the basis of like operations.

The values given are based on the selling price, f.o.b. cars, barges, or trucks, at the quarry.

County	Macadam and ballast		Rubble and riprap		Concrete		Unclassified		Totals	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value
Alameda	173,859	$122,573			40,109	$30,137	[a]760,544	$217,840	974,512	$370,550
Amador	23,393	15,100							23,393	15,100
Butte	82,562	62,145			*	*	*	*	82,562	62,145
Fresno	2,494	1,446			69,411	56,260	*	*	71,905	57,706
Imperial	31,015	19,097					100	150	31,115	19,147
Kern	42,402	54,502			*	*	*	*	42,402	54,502
Los Angeles	[b]222,878	59,746	40,712	55,515	288,014	370,449	2,390,594	667,335	2,942,198	1,153,045
Marin	56,983	56,983	11,682	12,531	*	*	*	*	68,665	69,514
Mariposa	*	*					54,284	36,193	54,284	36,193
Merced	38,900	30,060							38,900	30,060
Modoc	111,455	51,739							111,455	51,739
Monterey	[b]76,390	34,856					*	*	76,390	34,856
Nevada	17,600	17,600							17,600	17,600
Placer	31,045	31,045							31,045	31,045
Plumas			79,753	49,272					79,753	49,272
Riverside	*	*	223,287	208,270	*	*			223,287	208,270
Sacramento	43,367	42,028	*	*	*	*	54,053	42,240	97,420	84,268
San Bernardino			*	*	*	*	41,792	44,893	41,792	44,893
San Diego	*	*	37,540	33,969	46,000	37,000			83,540	70,969
San Mateo			1,285	1,578	67,377	70,236	*	*	68,662	71,814
Santa Barbara	65,504	41,126			2,270	2,075	64,170	18,103	131,944	61,304
Santa Clara	205,910	113,200					76,351	42,383	282,261	155,583
Santa Cruz	3,911	1,721	3,815	2,963	401	351	2,250	563	10,377	5,598
Shasta	[d]286,055	182,599	1,300	650			14,330	13,700	301,685	196,949
Siskiyou	[e]288,461	77,996			*	*	*	*	288,461	77,996
Tehama	66,000	50,000							66,000	50,000
Trinity	16,227	8,788							16,227	8,788
Tulare			1,608	804			27	18	1,635	822
Tuolumne	*	*					36,270	31,980	36,270	31,980
Ventura					20,605	9,701			20,605	9,701
Yuba	*	*	*	*			14,702	9,178	14,702	9,178
Contra Costa, El Dorado, Mariposa, Napa, Riverside, San Diego, Sonoma, Tuolumne*	173,004	166,909							173,004	166,909
Contra Costa, Del Norte, El Dorado, Madera, Napa, Sacramento, San Bernardino, Yuba*			186,412	292,475					186,412	292,475
Butte, Contra Costa, El Dorado, Kern, Marin, Napa, Riverside, Sacramento, San Benito, San Bernardino, Siskiyou, Sonoma*					265,956	241,044			265,956	241,044
Butte,[a] Contra Costa, El Dorado, Fresno, Kern, Mariposa, Monterey, San Benito, San Francisco, San Joaquin, San Mateo, Siskiyou, Solano, Sonoma*							948,464	571,299	948,464	571,299
Totals	2,059,415	$1,241,259	587,394	$658,027	800,143	$817,253	4,457,931	$1,695,775	7,904,883	$4,412,314

* Combined to conceal output of a single operator in each.
[a] Includes granules for roofing and terrazzo.
[b] Includes decomposed granite.
[d] Includes slag.
[e] Includes volcanic cinder.

Miscellaneous Stone Production of California, by Years.

The amount and value, annually, of crushed rock (including macadam, ballast, rubble, riprap, and that for concrete), and sand and gravel, since 1893, follow:

Crushed Rock, Sand and Gravel, by Years

Year	Tons	Value	Year	Tons	Value
1893	371,000	$456,075	1918	6,641,144	$3,325,889
1894	661,900	664,838	1919	6,919,188	3,678,322
1895	1,254,688	1,095,939	1920	9,792,122	6,782,414
1896	960,619	839,884	1921	10,914,145	7,834,640
1897	821,123	600,112	1922	13,049,644	10,366,231
1898	1,177,365	814,477	1923	19,840,301	15,379,838
1899	964,898	786,892	1924	21,451,129	15,962,476
1900	789,287	561,642	1925	23,819,137	17,407,113
1901	530,396	641,037	1926	24,987,606	19,859,261
1902	2,056,015	1,249,529	1927	25,126,691	18,912,994
1903	2,215,625	1,673,591	1928	27,471,794	17,328,044
1904	2,296,898	1,641,877	1929	27,104,618	17,840,159
1905	2,624,257	1,716,770	1930	23,514,168	16,430,027
1906	1,555,372	1,418,406	1931	15,848,313	11,848,531
1907	2,288,888	1,915,015	1932	11,361,564	7,183,643
1908	3,998,945	3,241,774	1933	11,181,156	6,871,581
1909	5,531,561	2,708,326	1934	16,148,275	7,131,330
1910	5,827,828	2,777,690	1935	9,041,876	5,571,041
1911	6,487,223	3,610,357	1936	28,528,079	16,578,238
1912	8,044,937	4,532,598	1937	28,254,740	16,917,683
1913	9,817,616	4,823,056	1938	19,051,677	11,734,038
1914	9,288,397	3,960,973	1939	18,693,896	10,316,787
1915	10,879,497	4,609,278	1940	24,184,186	12,181,564
1916	9,951,089	4,009,590			
1917	8,069,271	3,505,662	Totals	501,390,244	$331,297,232

A comparison of the above table of annual production of these materials with the similar table for cement (see *ante*) reveals the fact that the important growth of the crushed rock and gravel business was coincident with the rapid development of the cement industry from the year 1902.

CHAPTER FIVE

INDUSTRIAL MATERIALS

Bibliography: State Mineralogist Reports XII-XXXVI (inc.). Bulletin 38. Min. & Sci. Press, Vol. 114, March 10, 1917. Spurr and Wormser, "Marketing of Metals and Minerals." "Non-Metallic Minerals," by R. B. Ladoo. "Industrial Minerals and Rocks," A. I. M. E., 1937. See also under each substance.

The following mineral substances have been arbitrarily arranged under the general heading of 'Industrial Materials,' as distinguished from those which have clearly a defined classification, such as metals, salines, structural materials, etc.

These materials, many of which are mineral earths, are, with four or five exceptions, as yet produced on a comparatively small scale. The possibilities of development along several of these lines are large, and with increasing transportation and other facilities, together with steadily growing demands, the future for this branch of the mineral industry in California is promising. There is scarcely a county in the State but might contribute to the output.

Up to within the last few years, at least, production has been in the majority of instances dependent upon more or less of a strictly local market, and the annual tables show the results of such a condition, not only in the widely varying amounts of a certain material produced from year to year, but in widely varying prices of the same material.

The more important of these minerals thus far exploited, so far as shown by value of the output, are barytes, bentonite (fuller's earth), pottery clay, diatomite, dolomite, gypsum, limestone, mineral water, pumice and volcanic ash, pyrite, silica, and soapstone and talc.

In 1937 the mineral zircon was added to this group. The material mined was used as an abrasive and a refractory.

This group as a whole showed an increase in total value from $5,622,449 in 1939 to $6,388,748 in 1940.

The following table gives the comparative figures for the amounts and value of industrial minerals produced in California during the years 1939 and 1940:

Substance	1939		1940		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Bentonite	11,284 tons	$138,854	10,360 tons	$174,002	$35,148+
Carbon dioxide	*	*	97,660Mcu.ft.	23,877	* +
Clay (pottery)	305,517 tons	611,599	324,399 tons	687,871	76,272+
Dolomite	17,791 tons	40,391	18,178 tons	52,167	11,776+
Feldspar	2,076 tons	12,510	3,022 tons	16,644	4,134+
Gems		2,500		3,176	676+
Gypsum	219,671 tons	437,343	314,834 tons	599,944	162,601+
Limestone	316,029 tons	838,235	563,999 tons	895,832	57,597+
Mineral water	16,678,741 gals.	735,988	16,190,549 gals.	960,701	224,713+
Pumice and volcanic ash	41,109 tons	159,951	35,162 tons	126,516	33,435—
Silica (sand and quartz)	86,229 tons	349,074	101,041 tons	376,723	27,649+
Soapstone and talc	31,820 tons	372,078	37,433 tons	329,425	42,653—
Strontium	*	*	627 tons	8,686	* +
Sulphur	4,811 tons	73,741	8,156 tons	105,619	31,878+
Unapportioned*		[a]1,850,185		[b]1,996,565	146,380+
Total values		$5,622,449		$6,388,748	
Net increase					$766,299+

* Included under 'Unapportioned.'

[a] Includes barite, calcium silicate, carbon dioxide, garnets (abrasive), lithia, pyrite, sillimanite-andalusite-kyanite group.

[b] Includes barite, calcium silicate, diatomite, lithia, mica, pyrite, sillimanite group, zircon.

ASBESTOS

Bibliography: State Mineralogist Reports XII-XIX (inc.), XXII, XXVII (inc.), XXIX, XXXI-XXXII, XXXIV-XXXVI. Bulletins 38, 91. Canadian Dept. of M., Mines Branch Bulletin 69. Min. and Sci. Press, April 10, 1920, pp. 531-533. Eng. & Min. Jour.-Press, Vol. 113, pp. 617-625, 670-677. Asbestology, Vol. 5, No. 7, July, 1927.

During 1940 there was no asbestos reported produced in California. In 1934 there was a small output of this material coming from a property in Napa County, and was used in roofing and plaster. The 1934 annual figures are combined under the 'Unapportioned' item to conceal the output of a single operator.

There are two varieties of asbestos, amphibole and serpentine. The most valuable and widely used is the serpentine or chrysotile variety. Chrysotile asbestos has short strong fibers varying in length from $\frac{1}{8}$ of an inch to three inches but mostly less than one inch. The value of the material varies greatly as to the length of the fiber; the longer demanding a premium. It is used as insulation for heat and electricity, in brake linings, steam packing, pipe coverings, in paint, waterproof paper, roofing, cement, stucco, and plasters, in heat resisting textiles, as gloves, curtains, cord, etc.

The amphibole variety may be any one of several minerals of the amphibole group, the fibers of this type are weak and often brittle, and they are much more abundant but their uses are limited and value small; being restricted to heat insulation, chemical filters, and sometimes as a filler.

Asbestos Production of California, by Years.

Total amount and value of asbestos production in California since 1887, as given in the records of this Bureau, are as follows:

Year	Tons	Value	Year	Tons	Value
1887	30	$1,800	1912	90	$2,700
1888	30	1,800	1913	47	1,175
1889	30	1,800	1914	51	1,530
1890	71	4,260	1915	143	2,860
1891	66	3,960	1916	145	2,380
1892	30	1,830	1917	136	10,225
1893	50	2,500	1918	229	9,903
1894	50	2,250	1919}*	131	6,240
1895	25	1,000	1920}		
1896			1921	410	19,275
1897			1922	50	1,800
1898	10	200	1923	20	200
1899	30	750	1924	70	4,750
1900	50	1,250	1925}*	25	1,650
1901	110	4,400	1926}		
1902			1927}*	13	1,160
1903			1928}		
1904	10	162	1929}*	219	6,175
1905	112	2,625	1930}		
1906	70	3,500	1931		
1907	70	3,500	1932}*	309	3,274
1908	70	6,100	1934}		
1909	65	6,500	1935		
1910	200	20,000	1936		
1911	125	500	Totals	3,392	$145,984

* Annual details concealed under 'Unapportioned.'

BARITE

Bibliography: State Mineralogist Reports XXII, XIV, XV, XVII, XXI-XXVIII (inc.), XXXIV-XXXV (inc.). Bulletins 38, 87. Eng. & Min. Jour.-Press, Vol. 114, p. 109, July 15, 1922; Vol. 115, pp. 319-324, Feb. 17, 1923. U. S. Bureau of Mines, Inform. Circ. 6221, 6223.

During 1940 the barite (including some witherite) produced in California came from two properties, one each in Mariposa and Nevada counties, the annual details being concealed in the 'Unapportioned' item so as not to reveal the output of either operator. This material was consumed in the manufacture of lithopone, a heavy-gravity oil-well drilling-mud, fillers, and barium chemicals.

Commercial production of barite in California for 1938 and 1939 amounted to a total of 66,228 short tons valued at $396,218 f.o.b. rail shipping point.

Barite's largest use in the United States is in the manufacture of lithopone, which is a chemically-prepared white pigment containing approximately 70% barium sulphate and 30% zinc sulphide. This is one of the principal constituents of 'flat' wall paints. Other important uses for barite, after washing and grinding, are as an inert pigment and filler in paint, paper, linoleums, oilcloth and rubber manufacture, and in the preparation of a number of chemicals including barium binoxide, carbonate, chloride, nitrate, the sulphate precipitated, or 'blanc fixe,' and in medicine.

The Tariff Act of 1930 placed a duty on foreign imported barite ore, crude or unmanufactured, of $4 per ton; ground or otherwise manufactured, of $7.50 per ton.

Present (Aug. 14, 1941) quotations for barite (95% $BaSO_4$) vary from $6.25 to $7.00 per ton, crude, f.o.b. rail shipping point. Most barite has to be washed and acid treated to remove iron stains or other impurities before being suitable for paint use.

Known occurrences of this mineral in California are located in Inyo, Los Angeles, Mariposa, Monterey, Nevada, San Bernardino, Shasta, Santa Barbara and Tulare counties. The deposit at El Portal, in Mariposa County, has given the largest commercial production to date, in part witherite (barium carbonate, $BaCO_3$). Witherite has also been found in Shasta County, but no shipments have yet been made from the deposit. The carbonate is especially desirable, as it is a simpler and hence a cheaper source for preparation of barium chemicals, notably the nitrate which is used in priming mixture for incendiary bombs.

Total Barite Production of California.

The first recorded production of barite in California, according to the statistical reports of the State Mining Bureau, was in 1910. The annual figures are as follows:

Year	Tons	Value	Year	Tons	Value
1910	860	$5,640	1926	4,978	$38,165
1911	309	2,207	1927	17,993	90,617
1912	564	2,812	1928	13,406	55,888
1913	1,600	3,680	1929	26,796	168,829
1914	2,000	3,000	1930	19,783	133,107
1915	410	620	1931	27,832	156,647
1916	1,606	5,516	1932	8,507	49,409
1917	4,420	25,633	1933	8,405	49,595
1918	100	1,500	1934	21,769	125,514
1919	1,501	18,065	1935	22,979	133,810
1920	3,029	20,795	1936		
1921	901	4,809	1937	* 41,882	245,392
1922	3,370	18,925	1938		
1923	2,925	16,058	1939	* 66,228	396,218
1924			1940	*	*
1925			Totals	304,153	$1,772,461

* Annual details concealed under 'Unapportioned.'

BENTONITE (Fuller's Earth)

Bibliography: State Mineralogist Reports XIV, XVII, XVIII, XXI, XXIII, XXV-XXVI (inc.), XXXIV, XXXVI. Bulletins 83, 91. U. S. Bureau of Mines, Bulletin 71, Technical Paper 609. Eng. & Min. Jour.-Press, Vol. 121, pp. 837-842, May 22, 1926.

During 1940 there was a production and shipped in California, 10,360 short tons of bentonite valued at $174,002, from eight properties, four in San Bernardino County and two each in Kern and Inyo counties. The 1940 output as compared with that of 1939, which was 11,284 tons worth $138,854, and showed a decrease in total amount with an increase in value.

Previous to 1931 the Division of Mines classed this material under the heading of 'fuller's earth,' but it was thought advisable to change the name to bentonite, owing to the fact that much bentonite is employed in uses that can not be classed as fuller's earth and therefore had been classified in these reports under pottery clay. This was

somewhat confusing. Bentonite is the name commonly applied to the clays of the montmorillonite and halloysite group ('rock soap').

Fuller's earth includes many kinds of unctuous clays. It is usually soft, friable, earthly, nonplastic, white and gray to dark green in color, and some varieties disintegrate in water. Production has come mainly from Calaveras and Solano counties, with other deposits noted also in Riverside, Fresno, Inyo and Kern counties.

The Tariff Act of June 21, 1930, placed a duty of $1.50 a ton on foreign produced imported fuller's earth.

Bentonite Production of California, by Years.

Bentonite including a small amount of fuller's earth was first produced commercially in this State in 1899, and the total amount and value of the output since that time are as follows:

Year	Tons	Value	Year	Tons	Value
1899	620	$12,400	1921	1,185	$8,295
1900	500	3,750	1922	6,606	48,756
1901	1,000	19,500	1923	3,650	55,125
1902	987	19,246	1924	5,290	67,295
1903	250	4,750	1925	5,280	91,842
1904	500	9,500	1926	23,552	250,192
1905	1,344	38,000	1927	13,018	154,764
1906	440	10,500	1928	53,232	501,743
1907	100	1,000	1929	15,541	170,563
1908	50	1,000	1930	12,522	177,964
1909	459	7,385	1931	13,960	222,583
1910	340	3,820	1932	4,295	57,670
1911	466	5,294	1933	4,605	60,621
1912	876	6,500	1934	6,168	69,325
1913	460	3,700	1935	10,204	68,372
1914	760	5,928	1936	10,185	165,131
1915	692	4,002	1937	8,425	140,261
1916	110	550	1938	9,374	113,164
1917	220	2,180	1939	11,284	138,854
1918	37	333	1940	10,360	174,002
1919	385	3,810			
1920	600	6,000	Totals	223,031	$2,241,581

CALCIUM SILICATE

Bibliography: State Mineralogist Report XXXIV, Mining and Metallurgy: Oct., 1935.

During 1940 there were commercial shipments of calcium silicate reported in California, coming from one property in Kern County. The annual details are concealed in the 'Unapportioned' item so as not to reveal its output.

The first commercial production of wollastonite was made in 1933 from a deposit operated by John T. Thorndyke in the Radamacher District in Kern County, and was shipped from Code's Siding to Los Angeles, where it is used to manufacture mineral wool. This was done by a new process in an electric furnace where the material is melted without the use of a flux and then blown to a fine fiber or wool by compressed air from jets. Mineral wool is an excellent insulating material for sound, heat and cold, and the manufacturer expects to use large quantities in proposed steel houses. This material, also, can be used in the manufacture of unbreakable glass. Experiments being conducted for several years by Mr. A. M. M. Russell, Testing Engineer of the State Harbor Commission, shows that wollastonite increases the strength of concrete.

Pyroxene is a silicate of calcium and magnesium and is found in crystalline limestone near the contact with intrusive igneous rocks and in basic igneous rocks such as gabbros. It is white to various shades of green, brown to black, having a hardness of 5 to 6 and a specific gravity 3.2 to 3.6.

Wollastonite is a calcium metasilicate ($CaSiO_3$) and usually found in crystalline limestone at the contact with intrusive igneous rocks. It is a white to gray mineral, having a hardness of $4\frac{1}{2}$ to 5 and a specific gravity of about 2.9.

Calcium silicate from 1934 to 1936 was classed in these California mineral production reports as wollastonite.

CARBON DIOXIDE GAS

Bibliography: State Mineralogist Report XII.

Carbon dioxide gas was first produced commercially in California in 1894. This material came from a drift on the 575 level of the Santa Isabel shaft of the New Almaden Quicksilver mine at Almaden, Santa Clara County. The drift was bulkheaded and a pipe was placed through the bulkhead for the gas to be drawn off, it then being compressed into cylinders and used in the manufacture of soda water.

In 1933 carbon dioxide gas was again produced, this time from wells drilled near Niland, Imperial County. On November 1, 1934, a dry-ice plant was put into operation for condensation of the carbon dioxide produced from the above wells. During 1940 there were two companies producing carbon dioxide from wells near Niland and one company in Mendocino County produced from springs near Ukiah. The 1940 figures amounted to 97660 M cu. ft. valued at $23,877 and showed an increase in both amount and value over those of 1939.

Carbon Dioxide Gas Production in California, by Years

Year	M cubic feet	Value
1894	80	$4,072
1895	800	12,000
1896	81	1,300
1897		
1933		
1934 *	15,440	1,822
1935		
1936 *	89,777	64,787
1937		
1938 *	131,189	13,799
1939		
1940	*97,660	*23,877
Totals	335,027	$121,657

*Annual details concealed under 'Unapportioned.'

CLAY (Pottery)

Bibliography: State Mineralogist Reports I, IV, IX, XII-XV, XVIII-XXVIII (inc.), XXX-XXXIII (inc.), XXXV-XXXVI. Bulletins 38, 99. Preliminary Report No. 7, U. S. Bureau of Standards, Tech. Paper No. 262.

At one time or another in the history of the State, pottery clay has been mined in thirty-four of its counties. Of these, 21 contributed

in 1940. In this report, 'pottery clay' refers to all clays used in the manufacture of red and brown earthenware, china and sanitary ware, flower pots, floor, faience and ornamental tiling, architectural terra cotta, sewer pipe, drain and roof tile, etc., and the figures for amount and value are relative to the crude material at the pit without reference to whether the clay was sold in the crude form or was immediately used in the manufacture of any of the above finished products by the producer. It does not include clay used in making brick and hollow building blocks.

There are many other important uses for clay besides pottery manufacture. Among these may be enumerated paper, cotton goods, and chemicals. Clays of the montmorillonite and halloysite group ('rock soap') are being utilized successfully in the manufacture of soaps and for filtering oils and as oil-well drilling mud, also as an earth filler in irrigating ditches which run through porous ground.

During 1940 there was a total of 52 properties in 21 counties which reported an output of 324,399 short tons of pottery clay valued at $687,871 f.o.b. rail shipping point for crude material, as compared with 57 properties in 23 counties producing 307,517 tons of clay worth $611,599 in 1939.

Because of the fact that a given product often requires a mixture of several different clays, and that these are not all found in the same pit, it is necessary for most clay-working plants to buy some part of their raw materials from other localities. For these reasons, in compiling the clay industry figures much care is required to avoid duplications. So far as we have been able to segregate the figures, from the data sent in by the operatives, we have credited the clay output to the counties from which the raw material originated; and have deducted tonnages used in brick manufacture, as bricks are classified separately, herein.

A tabulation of the direct returns from the producers, by counties, for the year 1940 is shown herewith:

Pottery Clay in 1940

County	Tons	Value	Used in the manufacture of
Alameda	6,860	$10,349	Roofing, floor, and mantel tile; chimney, drain, and sewer pipe. Prepared clay and various.
Amador[a]	34,282	67,164	Architectural terra cotta; fire clay and refractories; chimney, drain and sewer pipe; floor, mantel, and roofing tile; art pottery; electrical porcelain; and various.
Los Angeles	26,046	18,316	Red earthenware; chimney, drain and sewer pipe; vents; floor, mantel, and roofing tile; art pottery; and various.
Orange[a]	45,555	151,005	Architectural terra cotta; conduits and segment blocks; electrical, porcelain, and chinaware; refractories; vents; drain, floor, and mantel tile; art pottery; and various.
Placer	57,323	81,709	Architectural terra cotta; chimney, drain and sewer pipe; faience; floor, mantel, and roofing tile; red earthenware; electrical porcelain; sanitary ware; and various.
Riverside[a]	61,291	124,338	Conduit, sewer, and drain pipe; red earthenware; faience, floor, mantel, and roofing tile; and various.
San Bernardino	7,043	55,751	Roofing, floor and mantel tile; drain and sewer pipe; red earthenware; refractories; fire sand and various.
Calaveras, Contra Costa, Fresno, Humboldt, Kern[b], Mono, Sacramento, San Diego, San Joaquin, San Luis Obispo[b], Stanislaus, Sutter, Tulare, Ventura[b]	*93,042	179,239	Drain, roofing, and mantel tile; saggers; electrical porcelain; refractories; red earthenware; garden furniture; oil-well drilling-mud; sewer, drain, and conduit pipe; prepared clay, light weight aggregate; and various.
Totals	324,399	$687,871	

[a] Includes fire sand.
[b] Includes clay and shale used for oil-well drilling-mud.
* Combined to conceal the output of single operators in each.

POTTERY CLAY PRODUCTS

The value of the various pottery clay products manufactured in California during 1940 totaled $12,954,733, as compared with $11,320,683 for the year 1939. The distribution for 1940 is shown in the following tabulation:

Product	Number of producers	Tons	Value
Architectural terra cotta and chimney pipe and flue lining	9	13,625	$802,143
Drain tile	19	7,971	134,513
Roofing tile	17	38,105	736,529
Floor, faience, mantel and handmade tile	24		2,951,868
Sewer pipe	7	61,745	1,582,574
Red earthenware	6		148,054
Stoneware and chemical stoneware	5		441,226
Chinaware and semi-vitreous tableware	8		2,304,811
Electrical porcelain	5		395,981
Sanitary ware and plumbing fixtures	4		2,479,066
Art pottery	3		53,930
Conduit pipe	4		231,949
Fire clay and high-temperature cement	9	14,207	204,679
Miscellaneous: gas stove vents, grog, glass tank backs, clay shapes, light weight aggregate, segment blocks, specialties, garden furniture, sundries and various	14		487,592
Total value			$12,954,733

In 1940 most ceramic products showed an increase in their total value as compared with the previous year, with the exception of stone-

ware and chemical stoneware, art pottery, and the materials listed under miscellaneous and specialties.

Photo by Walter W. Bradley

Plant of Los Angeles Brick & Clay Products Co., at Alberhill, Riverside County, California.

Pottery Clay Production of California, by Years.

Amount and value of crude pottery clay output in California since 1887 are given in the following table:

Year	Tons	Value	Year	Tons	Value
1887	75,000	$37,500	1915	$157,866	$133,724
1888	75,000	37,500	1916	134,636	146,538
1889	75,000	37,500	1917	166,298	154,602
1890	100,000	50,000	1918	112,423	166,788
1891	100,000	50,000	1919	135,708	245,019
1892	100,000	50,000	1920	203,997	440,689
1893	24,856	67,284	1921	225,120	362,172
1894	28,475	35,073	1922	277,232	473,184
1895	37,660	39,685	1923	376,863	697,841
1896	41,907	62,900	1924	417,928	651,857
1897	24,592	30,290	1925	537,587	674,376
1898	28,947	33,747	1926	801,461	806,509
1899	40,600	42,700	1927	867,419	872,661
1900	59,636	60,956	1928	887,807	1,394,950
1901	55,679	39,144	1929	839,949	1,127,527
1902	67,933	74,163	1930	938,586	795,517
1903	90,972	99,907	1931	332,680	408,931
1904	84,149	81,952	1932	167,284	204,890
1905	133,805	130,146	1933	141,629	211,711
1906	167,267	162,283	1934	190,510	245,900
1907	160,385	254,454	1935	240,014	377,969
1908	208,042	325,147	1936	382,823	646,920
1909	299,424	465,647	1937	354,669	705,200
1910	249,028	324,099	1938	304,564	582,608
1911	224,576	252,759	1939	305,517	611,599
1912	199,605	215,683	1940	324,399	687,871
1913	231,179	261,273			
1914	179,948	167,552	Totals	12,988,534	$17,326,897

DIATOMITE (Diatomaceous Earth)

Bibliography: State Mineralogist Reports II, XII-XV (inc.), XVII-XXVIII (inc.), XXXI, XXXIII, XXXV-XXXVI. Bulletins 38, 67, 91. Am. Inst. Min. Eng., Bull. 104, Aug. 1915, pp. 1539-1550. U. S. Bur. of Mines, Rep. of Investigations: Serial No. 2341, Jan. 1923. Eng. & Min. Jour.-Press, Vol. 115, pp. 1152-1154, June 30, 1923.

Diatomite, also known as diatomaceous earth, infusorial earth, tripolite and kieselguhr, is very light (when dry a cubic foot weights 18 to 20 pounds) and extremely porous, chalk-like material composed of pure silica (chalk, being calcareous) which has been laid down under water and consists of the remains of microscopical infusoria and diatoms. The former are animal remains, and the latter are from plants.

The most important deposits in California thus far known are located in Los Angeles, Monterey, Orange, San Luis Obispo, and Santa Barbara counties. The diatomaceous earth of marine origin has proved of superior quality for filtration uses which bring the higher prices. Infusorial or diatomaceous earths are also found in Contra Costa, Fresno, Kern, Plumas, San Benito, San Bernardino, San Joaquin, Shasta, Sonoma, and Tehama counties.

As about 70 percent of the California output is from a single operator, we have concealed the exact figures under the 'Unapportioned' item in the State and county totals. There were four operators during 1940, one each in Contra Costa, Los Angeles, Monterey, and Santa Barbara counties. The shipments during the year showed an increase in total tonnage and value compared with 1939.

The material shipped was utilized for insulation of both heat and sound, filtration, paint, pigment, cement admixture, fillers, abrasives and for clarification of gasoline and kerosene.

Total Production of Diatomite in California.

The first recorded production of these materials in California occurred in 1889; total amount and value of output, to date, are as follows:

Year	Tons	Value	Year	Tons	Value
1889	39	$1,335	1916	15,322	$80,649
1890			1917	24,301	127,510
1891			1918	35,963	189,459
1892			1919	40,200	217,800
1893	50	2,000	1920	60,764	1,056,675
1894	51	2,040	1921	*90,739	1,016,675
1895			1922		
1896			1923		
1897	5	200	1924	*193,064	5,729,736
1898			1925		
1899			1926		
1900			1927	*275,403	1,995,923
1901			1928		
1902	422	2,532	1929		
1903	2,703	16,015	1930	*300,017	4,848,661
1904	6,950	112,282	1931		
1905	3,000	15,000	1932		
1906	2,430	14,400	1933	*203,228	3,104,154
1907	2,531	28,948	1934		
1908	2,950	32,012	1935		
1909	500	3,500	1936	*290,908	4,243,572
1910	1,843	17,617	1937		
1911	2,194	19,670	1938		
1912	4,129	17,074	1939	*266,358	3,941,941
1913	8,645	35,968	1940		
1914	12,840	80,350			
1915	12,400	62,000	Totals	1,859,949	$26,875,498

* Annual details concealed under 'Unapportioned.'

DOLOMITE

Bibliography: State Mineralogist Reports XV, XVII, XXVII, XXVIII, XXXI, XXXIII-XXXIV.

The 1940 output of dolomite in California came from one property each in Inyo, Los Angeles, and San Benito counties and amounted to a total of 18,178 tons valued at $52,167. Also not included in the above figures was a tonnage of dolomite coming from Tuolumne County burnt for lime, but it is included with the lime figures. The 1940 production showed an increase in amount and value as compared with that of 1939. The property in Monterey County did not produce during 1940 but they expect to operate most of 1941.

The material shipped was utilized for steel-furnace flux and refractories, plaster, stucco dash-coat, terrazzo, kalsomine, poultry grits, artstone, for the manufacture of CO_2, and mineral wool.

Dolomite Production of California, by Years.

Previous to the 1915 statistical report of the State Mining Bureau, dolomite was included under limestone, as the two minerals are closely related chemically; but since dolomite, as such, has been found to have certain distinctive applications, we here give it a separate classification.

Amount and value of the output of dolomite, annually, have been as follows:

Year	Tons	Value	Year	Tons	Value
1915	4,192	$14,504	1929	53,644	$156,928
1916	13,313	46,566	1930*	66,564	161,245
1917	27,911	66,416	1931*		
1918	24,560	79,441	1932	35,275	40,956
1919	24,502	67,953	1933	54,456	176,575
1920	42,388	132,791	1934*	108,645	304,984
1921	31,195	99,155	1935*		
1922	52,409	114,911	1936	25,807	63,102
1923	69,519	142,615	1937	12,371	24,632
1924	28,843	71,271	1938	4,363	18,339
1925	42,852	104,900	1939	17,791	40,391
1926	68,640	119,313	1940	18,178	52,167
1927	45,976	79,442			
1928	38,379	85,342	Totals	1,016,773	$2,263,930

*Annual details concealed under 'Unapportioned.'

FELDSPAR

Bibliography: State Mineralogist Reports XV, XVII-XXVIII (inc.), XXX, XXXI, XXXIV-XXXVI (inc.). Bulletins 67, 91. U. S. Bureau of Mines, Bulletin 92. Eng. & Min. Jour.-Press, Vol. 115, pp. 535-538, Mar. 24, 1923.

The 1940 output of feldspar in California came from one property each in Fresno, San Bernardino, and San Diego counties, and amounted to 3,022 tons valued at $16,644. The 1940 production was an increase in both amount and value as compared with that of 1939, which was 2,076 tons worth $12,510.

The requirements of the pottery trade demand that in general the percentage of free silica associated with the feldspar be less than 20 percent, and in some cases the potters specify less than 5 percent. An important factor, also, is the iron-bearing minerals frequently present in pegmatites and granites, such as biotite (black mica), garnet, hornblende and black tourmaline. Feldspar for pottery uses should be practically free of these. The white, potash-mica, muscovite, is not particularly objectionable except that being in thin, flexible plates, it does not readily grind to a fineness required for the feldspar. It is also used in the manufacture of glass, enamel and sanitary ware, in soaps and abrasives, and as a binder for abrasive wheels, etc., all of which have similar specifications to that for pottery.

Total Feldspar Production in California.

Total amount and value of feldspar production in California since the inception of the industry are given in the following table, by years:

Year	Tons	Value	Year	Tons	Value
1910	760	$5,720	1927	10,932	$86,101
1911	740	4,560	1928	14,628	93,745
1912	1,382	6,180	1929	13,327	78,404
1913	2,129	7,850	1930	5,014	35,654
1914	3,530	16,565	1931	4,795	59,921
1915	1,800	9,000	1932	2,294	15,988
1916	2,630	14,350	1933*	2,655	30,611
1917	11,792	46,411	1934*		
1918	4,132	22,061	1935	3,265	21,855
1919	1,272	12,965	1936	3,430	24,959
1920	4,518	26,189	1937	2,686	10,930
1921	4,349	28,343	1938	1,378	6,970
1922	4,587	37,109	1939	2,076	12,510
1923	11,100	81,800	1940	3,022	16,644
1924	9,055	68,112			
1925	8,165	59,615	Totals	149,733	$997,527
1926	7,300	56,400			

* Annual details concealed under 'Unapportioned.'

FLUORSPAR

Bibliography: State Mineralogist Reports XVII, XVIII, XXIV, XXVI. Bulletins 67, 91. Eng. & Min. Jour.-Press, Vol. 177, pp. 489-492, Mar. 22, 1924.

During 1940 there was no commercial production of fluorspar reported in California.

Fluorspar, or calcium fluoride, CaF_2, is one of the most important nonmetallic minerals from an industrial standpoint. About 80 percent of the commercial mineral is prepared in the 'gravel' form and utilized as a flux in the manufacture of steel, for which use no substitute has yet been found.

In California deposits have been reported in Los Angeles, Mono, Riverside and San Bernardino counties. A previous commercial production was made in 1917-1918, when a total of 79 tons valued at $991 was shipped from Riverside County, and in 1933-1934 with 227 tons worth $3,631 coming from San Bernardino County.

Present quotations (Metal and Mineral Markets) are: not less than 85 percent CaF_2 and not over 5 percent SiO_2, $21 per ton; No. 2 lump, $21 per ton.

GARNET (Abrasive)

During 1940 the property that shipped abrasive garnets from near Bishop, Inyo County, was shut down. In 1938 and 1939 there were shipments of garnets to the extent of 223 short tons worth $3,375. This was the first commercial production reported in California. The annual figures are concealed under the 'Unapportioned' item so as not to reveal the output of the operator.

Most garnets are utilized on paper and cloth used for woodworking and shoe manufacture and in sand blasting.

Massive deposits of garnet have been noted in several places in California but little has been done to commercialize them owing to the lack of a market.

GEMS

Bibliography: State Mineralogist Reports II, XIV, XV, XVII, XVIII, XX, XXI-XXVIII (inc.), XXX-XXXII (inc.), XXXIV-XXXV. Bulletins 37, 67, 91. U. S. G. S., 'Mineral Resources of the U. S.'; Bull. 603, p. 208. Bull. Dept. Geo. Univ. of Cal., Vol. 5, pp. 149-153, 331-380. Am. Jour. Sci., Vol. 31, p. 31.

The production of gem materials in California has been somewhat irregular and uncertain since 1911. The compilation of complete statistics is difficult owing to widely-scattered places at which stones are gathered and marketed, for the most part in a small way. The gem material reported mined and sold during 1940 in California had a total value of $3,176. This output came from Imperial, Modoc, Monterey, Napa, San Benito, San Diego, and Santa Clara counties and consisted of jasper, iceland spar, onyx (chalcedony), iridescent obsidian, silicified serpentine with cinnabar, beryl, tourmaline, kunzite, and rock crystal. The above value was an increase over that of 1939 which was $2,500.

Varieties of California's Gem Stones.

Diamonds have been found in a number of localities in California; but in every case, they have been obtained in stream gravels while working them for gold. The principal districts have been: Volcano in Amador County; Placerville, Smith's Flat and others in El Dorado County; French Corral, Nevada County; Cherokee Flat, Morris Ravine, and Yankee Hill, Butte County; Gopher Hill and upper Spanish Creek, Plumas County. The most productive district of recent years has been Cherokee in Butte County.

California *tourmalines* are decidedly distinctive in coloring and 'fire' as compared to foreign stones of this classification. The colors range from deep ruby to pink, and various shades of green, also blue.

One of our California gem stones, *benitoite,* has not been found elsewhere; and in but a single locality here: The Dallas Mine in San Benito County.

Kunzite, a gem variety of spodumene, was first found in the Pala district in San Diego County. It has thus far been found in only one locality (Madagascar) outside of California. It is of a lilac color, and is described in detail in Bulletin 37 of the State Mining Bureau.

Beryls of excellent fire and delicate colors are also obtained in the Pala district, of which the *aquamarine* (blue) and *morganite* (pink) varieties deserve special mention. Morganite, like kunzite, has thus far been found elsewhere only in Madagascar.

Californite, or 'California jade,' is a gem variety of *idorase* (*vesuvianite*), and is green or white in color. It is found in Butte, Fresno, and Siskiyou counties.

Stones of precious blue *topaz* of fine quality are being cut from crystals mined in northern San Diego County. They are associated with beryl and blue tourmaline.

Some *rhodonite* has been mined in Siskiyou County, and used for decorative purposes, its value being included in the marble figures.

Garnets are found in a number of localities in California; the important yield of gems being *hyacinth* and *spessartite* varieties from San Diego County.

Chrysoprase has been produced in Tulare County.

Turquoise has been found in the desert section of San Bernardino County, but none produced commercially in recent years.

Sapphires have been reported found in San Bernardino and Riverside counties, but not as yet confirmed. A few have been found in stream gravels with diamonds in Butte County.

Rubies have been identified by the laboratory of the State Mining Bureas, occurring in limestone from the Baldy Mountains, San Bernardino County. Thus far no stones of commercial size have been taken out.

Total Production of Gem Materials in California.

The value of the gem output in California annually since the beginning of commercial production is as follows:

Year	Value	Year	Value
1900	$20,500	1922	$ 1,312
1901	40,000	1923	13,220
1902	162,100	1924	4,800
1903	110,500	1925	10,663
1904	136,000	1926	9,049
1905	148,500	1927	7,035
1906	497,090	1928	22,200
1907	232,642	1929	26,850
1908	208,950	1930	3,540
1909	193,700	1931	5,607
1910	237,475	1932	4,961
1911	51,824	1933	690
1912	23,050	1934	2,456
1913	13,740	1935	945
1914	3,970	1936	2,878
1915	3,565	1937	2,075
1916	4,752	1938	4,575
1917	3,049	1939	2,500
1918	650	1940	3,176
1919	5,425		
1920	36,056	Total value	$2,272,924
1921	10,954		

GRAPHITE

Bibliography: State Mineralogist Reports XIII, XIV, XV, XVII, XXVI (inc.), XXX, XXXIII, XXXV. Bulletins 67, 91. U. S. G. S., Min. Res. 1914, Pt. II.

Graphite (also called plumbago) has been produced from time to time in the State, coming principally from Sonoma and Los Angeles counties.

Occurrences of graphite have been reported at various times from Calaveras, Fresno, Imperial, Inyo, Los Angeles, Mendocino, San Bernardino, San Diego, Siskiyou, Sonoma and Tuolumne counties. From 1931 to 1933 there was a small production of graphite from a property in Los Angeles County.

During 1940 no production of graphite was reported in California. In 1935 there was a small output of graphite coming from a single property in Los Angeles County. This material was used for experimental purposes. The annual details are concealed under the 'Unapportioned' item in order not to reveal the output of the single operator.

The principal value of graphite is on account of its infusibility and resistance to the action of molten metals. It is also largely used in the manufacture of electrical appliances, of 'lead' pencils, as a lubricant, as stove polish, paints and in many other ways. Amorphous graphite, commonly carrying many impurities, brings a much lower price. For some purposes, such as foundry facings, etc., the low-grade material is satisfactory. Among the interesting uses for graphite is the prevention of formation of scale in boilers. The action is a mechanical one. Being soft and slippery, the graphite prevents the particles of scale from adhering to one another or to the boiler and they are thus easily removed.

Graphite Production of California, by Years.

According to the records of the State Mining Bureau, the graphite production of California, by years, has been as follows:

Year	Pounds	Value	Year	Pounds	Value
1901	128,000	$4,480	1923		
1902	84,000	1,680	1925		
1903			1926	*76,000	$13,120
1913	2,500	25	1927		
1914			1928		
1915			1931		
1916	29,190	2,335	1932	*156,000	1,950
1917			1933		
1918			1934		
1919	*770,000	37,225	1935	*	*
1920			1936		
1921					
1922	*624,000	26,160	Totals	1,869,690	$86,975

* Annual details concealed under 'Unapportioned,' on account of a single producer.

GYPSUM

Bibliography: State Mineralogist Reports XIV, XV, XVII, XVIII, XXII, XXIII, XXV-XXVIII (inc.), XXX, XXXI, XXX-XXXVI (inc.). Bulletins 38, 67, 91. U. S. Geol. Surv., Bull. 223, 413, 430, 697. U. S. Bur. of Standards, Circular No. 281.

During 1940 there were shipments of gypsum in California amounting to 314,834 short tons valued at $599,944, and came from four properties in Kern County, and one each in Fresno, Imperial, Monterey, and Riverside counties. In addition to the above figures, there was a considerable amount of gypsum coming from Alameda County, which was obtained in the chemical process of reducing magnesium salts from bittern water with lime, the amount of which is not included in the above data, as the figures are already contained in those of magnesium salts and lime. The 1940 output was the largest annual yield ever reported in this State and a marked increase over the 1939 figures which were 219,671 tons worth $437,343.

Uses.

The most important use of gypsum from the quantity standpoint is in the calcined form where it is utilized in the manufacture of various hard-wall plasters and plaster board. As plaster of paris, it plays a very important part in surgical work. Approximately 2%, by weight, raw gypsum is added in the manufacture of Portland cement just before the final grinding. In this application, the gypsum acts as a retarder to the set of the cement. The use of gypsum tile for non-bearing fireproof partitions, stairway and elevator enclosures, and the protection of steel columns, girders and beams, has increased greatly.

Keene's cement is a gypsum product, calcined to complete dehydration, and an accelerator added such as alum, potassium sulphate, borax, aluminum sulphate.

Land plaster may be applied to the soil by drilling, or scattered in the hill, or it may be sowed broadcast, in quantities ranging from 200 to 500 pounds to the acre.

Total Production of Gypsum in California.

Production of gypsum annually in California since such records have been compiled by this Bureau is as follows:

Year	Tons	Value	Year	Tons	Value
1887	2,700	$27,000	1915	20,200	$48,953
1888	2,500	25,000	1916	33,384	59,533
1889	3,000	30,000	1917	30,825	56,840
1890	3,000	30,000	1918	19,695	37,176
1891	2,000	20,000	1919	19,813	50,579
1892	2,000	20,000	1920	20,507	92,535
1893	1,620	14,280	1921	37,412	78,875
1894	2,446	24,584	1922	47,084	188,336
1895	5,158	51,014	1923	86,410	289,136
1896	1,310	12,580	1924	25,569	53,210
1897	2,200	19,250	1925	107,613	172,444
1898	3,100	23,600	1926	114,868	211,337
1899	3,663	14,950	1927	94,630	292,090
1900	2,522	10,088	1928	104,790	200,567
1901	3,875	38,750	1929	140,844	396,951
1902	10,200	53,500	1930	116,865	243,507
1903	6,914	46,441	1931	88,354	199,198
1904	8,350	56,592	1932	46,867	93,818
1905	12,859	54,500	1933	59,235	120,451
1906	21,000	69,000	1934	58,149	113,606
1907	8,900	57,700	1935	70,833	151,807
1908	34,600	155,400	1936	143,549	282,703
1909	30,700	138,176	1937	186,160	384,431
1910	45,294	129,152	1938	161,996	327,821
1911	31,457	101,475	1939	219,672	437,343
1912	37,529	117,388	1940	314,843	599,944
1913	47,100	135,050			
1914	29,734	78,375	Totals	2,735,887	$6,737,036

LIMESTONE

Bibliography: State Mineralogist Reports IV, XII-XV (inc.), XVII-XXXI (inc.), XXXIII-XXXV (inc.). Bulletins 38, 91. Oregon Agr. College Extension Bulletin 305. Eng. and Min. Jour.-Press, Vol. 120, pp. 249-253.

'Industrial' limestone was produced by twenty-three properties in eleven counties in California during 1940 to the amount of 563,999 tons valued at $895,832, this being an increase in amount and value over the 1939 output of 316,029 tons worth $838,235. The 1940 yield came from four properties each in El Dorado and Santa Clara counties; three each

in San Bernardino, Santa Cruz, and Tuolumne counties; two in Los Angeles County; and one each in Imperial, Inyo, Riverside, San Luis Obispo, and San Mateo counties.

The amount here does not include the limestone used in the manufacture of cement nor for macadam and concrete, nor of lime for building purposes; but accounts for that utilized as smelter and foundry flux, for glass and sugar making, and other special chemical and manufacturing processes. It also includes that utilized for fertilizers (agricultural 'lime'), 'roofing gravel,' paint and concrete filler, whiting for paint, putty, kalsomine, terrazzo, paving dust, chicken grit, carbon dioxide gas, 'paving compound,' facing dust for concrete pipe, also for rubber and magnesite mix. The material from Fresno County was marl; and that from San Mateo and Santa Clara counties was shells, dredged from San Francisco Bay, which were ground and used for agricultural purposes and poultry grit. Of the total 'industrial' limestone produced in 1940 approximately 73,002 tons valued at $272,892 were used for agricultural purposes and poultry grit.

Distribution of the 1940 output of limestone was as follows:

County	*Tons*	*Value*
El Dorado	261,713	$308,708
San Bernardino	18,127	59,901
Santa Clara[a]	190,753	227,340
Santa Cruz	30,807	73,875
Tuolumne	19,904	46,112
Imperial, Inyo, Los Angeles, Riverside, San Luis Obispo, San Mateo [b] *	42,695	179,896
Totals	563,999	$895,832

* Combined to conceal the output of individual operators in each.
[a] Includes shells.

Limestone Production of California, by Years.

The following tabulation gives the amounts and value of 'industrial' limestone produced in California by years since 1894 when compilation of such records was begun by the State Mining Bureau. These tonnages consist principally of limestone utilized for flux, glass and sugar making, agricultural, chemical, and other special industrial purposes. That utilized in cement manufacture is not included:

Year	Tons	Value	Year	Tons	Value
1894	15,420	$19,275	1919	88,291	$248,145
1895	71,355	71,690	1920	90,120	298,197
1896	68,184	71,112	1921	75,921	305,912
1897	36,796	38,556	1922	84,382	282,181
1898	27,686	24,548	1923	143,266	348,464
1899	30,769	29,185	1924	219,476	582,660
1900	32,791	31,532	1925	319,977	494,525
1901	76,937	99,445	1926	108,795	367,501
1902	71,422	90,524	1927	699,790	663,957
1903	125,919	163,988	1928	127,895	397,935
1904	40,207	87,207	1929	168,315	557,617
1905	192,749	323,325	1930	169,477	508,751
1906	80,262	162,827	1931	177,268	560,699
1907	230,985	406,041	1932	168,950	487,788
1908	273,890	297,264	1933	207,371	487,712
1909	337,676	419,921	1934	198,057	461,139
1910	684,635	581,208	1935	227,214	496,054
1911	516,398	452,790	1936	295,792	661,757
1912	613,375	570,248	1937	351,755	830,562
1913	301,918	274,455	1938	302,665	729,149
1914	572,272	517,713	1939	316,029	838,235
1915	146,324	156,288	1940	563,999	895,832
1916	187,521	217,733			
1917	237,279	356,396	Totals	10,285,131	$17,423,301
1918	208,566	456,258			

LITHIA

Bibliography: State Mineralogist Reports II, IV, XIV, XXI, XXX, XXXV. Bulletins 38, 67, 91.

During 1940 lithium salts were again produced in California; but coming from a single property, the figures are concealed under the 'Unapportioned' item. Starting with 1938, material came from the brines of Searles Lake in San Bernardino County at the plant of the American Potash and Chemical Corporation, in the form of sodium-lithium phosphate, and was the first output of this kind, previous production being the mineral lepidolite.

Lithia mica, lepidolite (a silicate of lithium and others), utilized in the manufacture of artificial mineral water, fireworks, glass, etc., has been mined in San Diego County since 1899, except between 1905 and 1915, though there was none shipped in 1923, 1925, 1929-1937 (inc.). During 1930 there was a small amount of lepidolite mined in California, but none shipped. Some amblygonite, a lithium phosphate, is occasionally also obtained from pockets associated with the gem tourmalines.

Lithia minerals total production in the State has been as follows:

Year	Tons	Value	Year	Tons	Value
1899	124	$4,600	1921		
1900	440	11,000	1922	*1,365	$20,781
1901	1,100	27,500	1923		
1902	822	31,880	1924	109	2,269
1903	700	27,300	1925		
1904	641	25,000	1926		
1905	25	276	1927	*550	13,900
1906			1928		
1915	91	1,365	1929		
1916	71	1,065	1938	378	100,338
1917	880	8,800	1939	*	*
1918	4,111	73,998	1940		
1919	800	14,400			
1920	10,046	153,502	Totals	22,253	$517,974

* Annual details concealed under 'Unapportioned.'

MICA

Bibliography: State Mineralogist Reports II, IV, XXVI-XXVIII (inc.), XXX, XXXIII-XXXVI (inc.). Bulletins 38, 67, 91. U. S. Geol. Surv., Bull. 740; Min. Res. of U. S. Eng. & Min. Jour.-Press, Vol. 115, pp. 55-60, Jan. 13, 1923.

Sericite, a fine-grained variety of muscovite, has been produced continuously since 1929 in California with the exception of 1934 and 1939. The 1940 output of mica came from a single property in Inyo County. The annual details are concealed in the 'Unapportioned' item so as not to reveal production of the individual operator. The material mined during the year was sericite. Sericite is used as a cheap grade of ground mica for roofing, as a refractory, foundry facing, and decorative material to imitate snow. A small amount of vermiculite, a hydrous mica, expanded by heating and then used as an insulating agent, was mined in 1936.

Classification and Uses.

Practically all marketable mica is of the muscovite or phlogopite varieties. There are three main commercial classes: Sheet mica, including punch; splittings, and scrap. Sheet mica is used chiefly for electrical purposes and for glazing; splittings are made into built-up mica; scrap is ground to a powder. Mica to be classified as sheet must yield a rectangle of at least 1½ x 2 in., must split evenly and freely, be free from cracks, rulings, or plications, and reasonably free from inclusions of foreign matter, though stains of a nonconducting character are permissible for some uses. Ability to withstand heat and high electrical resistance have led to a wide application of sheet mica in the electrical industries. The electrical uses of sheet mica greatly exceed all others in quantity and value of the material used.

As a heat-resisting transparent medium, sheet mica has various uses. It is widely employed for stove windows, though this use has declined to a considerable extent. A hard and rigid mica that is nearly clear is best suited for stove fronts. High-grade stove mica commands a higher price than electrical mica, because for the most part larger sizes are demanded. Mica is also used in furnace and bake-oven sight-holes, heat screens, lamp chimneys, canopies and shades, particularly for gas mantels, and also for military lanterns and in lantern slides.

Its ability to withstand shocks and strains, combined with its transparency, has led to wide use in spectacles, drivers' helmets, smoke helmets, compass cards, gage fronts, and in windows subject to shock, as in the conning towers of warships. On account of its heat-resisting qualities, ground mica is used in railroad car axle packings, foundry facing in pipe and boiler coverings, in fireproof paints, and in rubber tires. Ground mica is used as a component in roofing, as a filler in rubber and other products, in foundry facing, calico printing and as a tire powder. It is used also in tinsel decorations, and as 'Santa Claus snow' for Christmas tree and window decorations. It is used as a lubricant for wooden bearings, and mixed with oil for metal bearings.

The vermiculite variety is any of several hydrous mica minerals which expand upon heating. In recent years they have become valuable as an insulating agent for both heat and sound, when being expanded it often takes on a gold or silver color and is used in window decoration.

Production of mica in California has been as follows:

Year	Tons	Value	Year	Tons	Value
1902	50	$2,500	1935		
1903	50	3,800	1936	3,833	$15,650
1904	50	3,000	1937		
1929			1938	4,969	31,751
1930	2,240	15,260	1939		
1931			1940	*	*
1932					
1933	1,957	13,963	Totals	13,149	$85,924
1934					

* Annual details concealed under 'Unapportioned.'

MINERAL PAINT

Bibliography: State Mineralogist Reports XII-XIX (inc.), XXI, XXII-XXVIII (inc.), XXXV. Bulletins 38, 91.

During 1940 no output of mineral paint was reported in California. In 1937 there was a small amount of mineral paint produced, which came from a single property each in Nevada, Placer and Yuba counties. The details are concealed under 'Unapportioned' so as not to reveal individual output. The material from Nevada and Yuba counties was a limonite and that from Placer County a sienna.

These materials have come from Alameda, Amador, Butte, Calaveras, Colusa, Los Angeles, Napa, Nevada, Placer, Riverside, Shasta, Sonoma, Stanislaus and Ventura counties. There are also other deposits that may have possible commercial value, but as yet there have been no commercial shipments from El Dorado, Imperial, Kern, Kings, Lake, Mendocino, San Diego, Siskiyou, Trinity, and Yuba counties, in which they are found.

Mineral Paint Production of California, by Years.

The first recorded production of mineral paint materials in the State was in the year 1890. The output, showing annual amount and value since that time, is given herewith:

Year	Tons	Value	Year	Tons	Value
1890	40	$480	1915	311	$1,756
1891	22	880	1916	643	3,960
1892	25	750	1917	520	2,700
1893	590	26,795	1918	728	4,738
1894	610	14,140	1919	1,780	17,055
1895	750	8,425	1920	779	8,477
1896	395	5,540	1921	446	4,748
1897	578	8,165	1922	1,620	13,277
1898	653	9,698	1923	1,049	11,773
1899	1,704	20,294	1924	532	5,234
1900	529	3,993	1925	669	6,969
1901	325	875	1926	569	5,846
1902	589	1,533	1927		
1903	2,370	3,720	1928	919	9,592
1904	270	1,985	1929	467	2,820
1905	754	4,025	1930		
1906	250	1,720	1931	250	3,000
1907	250	1,720	1932		
1908	335	2,250	1933		
1909	305	2,325	1935	570	5,550
1910	200	2,040	1936		
1911	186	1,184	1937	*	*
1912	300	1,800	1938		
1913	303	1,780			
1914	132	847	Totals	23,717	$227,648

* Annual details concealed under 'Unapportioned.'

MINERAL WATER

Bibliography: State Mineralogist Reports VI, XII-XVIII (inc.), XXI-XXIX (inc.), XXXI, XXXIII (inc.), XXXV-XXXVI. U. S. G. S. Water Supply Paper 338. Min. Res., 1914, 1916. 'Mineral Springs and Health Resorts of California,' by Dr. Winslow Anderson, 1890. U. S. Dept. of Agr., Bur. of Chem., Bulletin 91.

A widespread production of mineral water is shown annually in California. These figures refer to mineral water actually bottled for sale, or for local consumption. Water from some of the springs having

a special medicinal value brings a price many times higher than the average shown, while in some cases the water is used merely for drinking purposes and sells for a nominal figure. Health and pleasure resorts are located at many of the springs. The waters of some of the hot springs are not suitable for drinking, but are very efficacious for bathing. From a therapeutic standpoint, California is particularly rich in mineral springs.

The commercial production of mineral water in California during 1940 amounted to 16,190,549 gallons valued at $960,701, as compared with 16,678,741 gallons worth $735,988 for 1939. The 1940 output came from springs on 38 properties in 18 counties and was distributed as follows:

County	*Gallons*	*Value*
Lake	20,588	$10,902
Los Angeles	7,150,460	475,089
Napa	127,681	16,250
Sonoma	12,028	3,288
Butte, Calaveras, Colusa, Contra Costa, Marin, Orange, Placer, Riverside, San Bernardino, San Diego, San Francisco, San Luis Obispo, Santa Barbara, Siskiyou *	8,879,792	455,172
Totals	16,190,549	$960,701

* Combined to conceal the output of operators in each.

The production above tabulated came either from springs or artesian wells, and was bottled, in part with artificial carbonation, but mostly natural, and sold for drinking purposes. A large part was used in the preparation of soft drinks with flavors.

Mineral Water Production of California, by Years.

Mineral water was bottled for sale, at the Napa Soda Springs, Napa County, as early as 1856,[1] and at other springs in California, notably The Geysers, Sonoma County, also at early dates; but there are no figures available earlier than the year 1887. Amounts and values, annually, since that year are shown herewith:

Year	Gallons	Value	Year	Gallons	Value
1887	618,162	$144,368	1915	2,274,267	$467,738
1888	1,112,202	252,990	1916	2,273,817	410,112
1889	808,625	252,241	1917	1,942,020	340,566
1890	258,722	89,786	1918	1,808,791	375,650
1891	334,553	139,959	1919	2,233,842	340,117
1892	331,875	162,019	1920	2,391,791	421,643
1893	383,179	90,667	1921	3,446,278	367,476
1894	402,275	184,481	1922	4,276,346	486,424
1895	701,397	291,500	1923	5,487,276	616,919
1896	808,843	337,434	1924	8,159,211	818,726
1897	1,508,192	345,863	1925	12,115,072	1,230,455
1898	1,429,809	213,817	1926	14,074,877	1,171,550
1899	1,338,537	406,691	1927	16,644,423	1,487,183
1900	2,456,115	268,607	1928	25,049,002	1,304,969
1901	1,555,328	559,057	1929	27,032,083	2,040,615
1902	1,701,142	612,477	1930	37,354,111	2,870,663
1903	2,056,340	558,201	1931	26,164,331	1,347,860
1904	2,430,320	496,946	1932	19,031,224	1,495,988
1905	2,194,150	538,700	1933	15,650,406	719,746
1906	1,585,690	478,186	1934	19,882,436	1,071,197
1907	2,924,269	544,016	1935	16,659,254	940,333
1908	2,789,715	560,507	1936	19,348,513	777,899
1909	2,449,834	465,488	1937	18,309,729	1,130,810
1910	2,335,259	522,009	1938	26,900,959	853,998
1911	2,637,669	590,654	1939	16,678,741	735,988
1912	2,497,794	529,384	1940	16,190,549	960,701
1913	2,350,792	599,748			
1914	2,443,572	476,169	Totals	405,823,709	$35,587,290

[1] Cronise, T. F., The natural wealth of California, p. 182, 1868.

PHOSPHATES

Bibliography: State Mineralogist Report XXI. Bulletins 67, 91.

No commercial production of phosphates has been recorded from California, though occasional pockets of the lithium phosphate, amblygonite, Li (AlF) PO_4, have been found associated with the gem tourmaline deposits in San Diego County. Such production has been classified under lithia. In 1938, recovery began on a commercial scale of sodium-lithium phosphate at the plant of the American Potash and Chemical Corporation, at Searles Lake, San Bernardino County. However, the product is sold for its lithium content rather than the phosphate, hence we record it under Lithia.

PUMICE and VOLCANIC ASH

Bibliography: State Mineralogist Reports XII, XIV, XV, XVII, XVIII, XXII-XXV (inc.), XXX-XXXII (inc.), XXXIV-XXXVI (inc.). Bulletin 38. U. S. Bureau of Mines, I. G. 6560. (See 'Tufa.')

The production of pumice and volcanic ash in California during 1940 amounted to 35,162 short tons valued at $126,516, f.o.b. rail-shipping point. This output came from three properties each in Inyo, Madera, and Siskiyou counties; two properties in Kern County; and one each in Amador, Modoc, Mono, Napa, and San Luis Obispo counties. The 1940 figures showed a decrease in both amount and value as compared with those of 1939, which were 41,109 tons valued at $159,951.

The material from Inyo, Modoc, Mono, Napa, and Siskiyou counties and part from Madera County was 28,446 tons of lump pumice, which was used for light-weight aggregate in concrete, acoustic plaster, for abrasive purposes, scouring bricks, insulating, and chickenhouse litter. That from Amador, Kern, and San Luis Obispo counties, and a portion from Madera County was 6,716 tons of volcanic ash or tuff variety, and was employed in making soap, cleanser compounds, as a concrete filler in cement displacement, in asphalt, and as a carrier for dry agricultural sprays. The Kern County ash is going into the preparation of one of our popular and nationally advertised brands of cleanser compounds.

Pumice Production of California, by Years.

Commercial production of pumice in California was first reported to the State Mining Bureau in 1909, then not again until 1912, since which year there has been a small annual output, as indicated by the following table:

Year	Tons	Value	Year	Tons	Value
1909	50	$500	1926	7,170	$ 48,350
1910	----------	----------	1927	13,779	168,896
1911	----------	----------	1928	10,440	105,055
1912	100	2,500	1929	10,449	76,123
1913	3,590	4,500	1930	12,947	128,847
1914	50	1,000	1931	11,711	108,130
1915	380	6,400	1932	9,891	86,034
1916	1,246	18,092	1933	8,243	61,067
1917	525	5,295	1934	9,951	54,748
1918	2,114	28,669	1935	14,890	87,055
1919	2,388	43,657	1936	17,132	143,709
1920	1,537	25,890	1937	10,392	79,005
1921	406	6,310	1938	18,783	105,207
1922	613	4.248	1939	41,109	159,951
1923	2,936	16,309	1940	35,162	126,516
1924	4,919	33,404			
1925	5,319	32,937	Totals	248,222	$1,768,404

PYRITES

Bibliography: State Mineralogist Reports XVIII, XIX, XXII, XXV, XXVI, XXX, XXXV. Bulletins 38, 91. Min. and Sci. Press, Vol. 144, pp. 825, 840.

Pyrite, shipped in California during 1940, came from a single property in Shasta County and showed an increase in both quantity and value over that of 1939. The annual details are placed under 'Unapportioned' to conceal the output of the individual operator.

This material was mostly used in the manufacture of sulphuric acid for explosives and fertilizer. Some iron sulphate had been produced previously and was utilized directly in the preparation of an agricultural fertilizer and insecticide. The sulphur content ranged up to 50.8% S.

This does not include the large quantities of pyrite, chalcopyrite, and other sulphides which are otherwise treated for their valuable metal contents. Some sulphuric acid is annually made as a by-product in the course of roasting certain tonnages of Mother Lode auriferous concentrates while under treatment for their precious metal values.

Pyrites Production in California, by Years.

The total recorded pyrites production in California to date is as follows:

Year	Tons	Value	Year	Tons	Value
1898	6,000	$30,000	1921	110,025	$473,735
1899	5,400	28,620	1922	151,381	570,425
1900	3,642	21,133	1923	148,004	555,308
1901	4,578	18,429	1924	124,214	517,835
1902	17,525	60,306	1925	129,500	528,550
1903	24,311	94,000	1926	100,896	466,088
1904	15,043	62,992	1927	130,910	564,823
1905	15,503	63,958	1928	90,566	400,627
1906	46,689	145,895	1929	79,169	363,717
1907	82,270	251,774	1930	39,958	194,228
1908	107,081	610,335	1931	25,402	131,174
1909	457,867	1,389,802	1932		
1910	42,621	179,862	1933 *	72,271	297,832
1911	54,225	182,954	1934		
1912	69,872	203,470	1935 *	157,129	547,754
1913	79,000	218,537	1936		
1914	79,267	230,058	1937 *	155,107	541,915
1915	92,462	293,148	1938		
1916	120,525	372,969	1939 *	127,604	452,901
1917	111,325	323,704	1940	*	*
1918	128,329	425,012			
1919	147,024	540,300	Totals	3,497,696	$12,884,751
1920	146,001	530,581			

* Annual details concealed under 'Unapportioned.'

SHALE OIL

Bibliography: State Mineralogist Report XIX. U. S. Geol. Surv., Bulletins 322, 729. U. S. Bur. of Mines, Bull. 210, Eng. and Min. Jour.-Press, Vol. 118, No. 8, pp. 290-292, Aug. 23, 1924. Chem. & Met. Eng., Vol. 32, No. 6, Feb. 1925. Min. Congress Jour., Dec. 1924.

Two plants on a more or less experimental scale operated for six years in California, with commercial production beginning in a small way in 1922. The product, in part, was sold for utilization as a flotation oil in metallurgical work, and part consumed as fuel at the plants. There has been no production reported since 1927.

Shale Oil Production of California, by Years

Year	Barrels	Value
1922 *	4,333	$44,262
1923		
1924 *	8,688	55,240
1925		
1926 *	8,819	9,998
1927		
1928		
Totals	21,840	$109,500

* Annual details concealed under 'Unapportioned.'

SILICA (Sand and Quartz)

Bibliography: State Mineralogist Reports IX, XIV, XV, XVII, XVIII, XX-XXVIII (inc.), XXXI-XXXIII (inc.), XXXV-XXXVI. Bulletins 38, 67, 91.

We combine these materials because of the overlapping roles of vein quartz which is mined for use in glass making and as an abrasive,

and that of silica sand which, although mainly utilized in glass manufacture, also serves as an abrasive. Both varieties are also utilized to some extent in fire-brick manufacture.

We do not include under this heading such forms of silica as: quartzite, sandstone, flint, tripoli, diatomaceous earth, nor the gem forms of 'rock crystal,' amethyst, and opal. Each of these has various industrial uses, which are treated under their own designations.

The production of silica in California during 1940 amounted to a total of 101,041 short tons valued at $376,723 f.o.b. rail shipping point and came from two properties in Contra Costa County, and one each in Orange, Placer, Riverside, and San Bernardino counties. The above is an increase in both amount and value over the 1939 output, which was 86,229 tons worth $349,074. The 1940 output consisted of 100,891 tons of glass sand and 150 tons of vein or boulder quartz, and was the largest recorded annual yield of silica in California, both as to amount and value. This is brought about by an increased production of glass sand.

Photo by Walter W. Bradley

Weisel Silica Sand Plant near Corona, Riverside County, California.

The glass sand came from Contra Costa, Orange and Riverside counties. For making the higher grades of glass, deposits in Contra Costa County have replaced the sand imported from Belgium. Belgium sand has displaced local material in the manufacture of sodium silicate ('water glass'). There are various deposits of quartz in California which could be utilized for glass making, but to date they have not been so used owing to the cost of grinding and the difficulty of preventing contamination by iron while grinding.

Silica sand has been produced in the following counties of the State: Alameda, Amador, Contra Costa, El Dorado, Imperial, Inyo, Los Angeles, Mariposa, Mono, Monterey, Orange, Placer, Riverside, San Diego, San Joaquin and Tulare, the chief centers being Contra Costa, Amador, Monterey and Los Angeles counties. The industry is of limited importance, so far, because of the fact that much of the available material is not of a grade which will produce first-class colorless glass; for such, it must be essentially iron-free. Even a fractional percent of iron imparts a green color to the glass.

The Tariff Act of June 21, 1930, placed a duty on sand, containing 95 per cent or more of *Silica* and not more than six-tenths of 1 per cent of oxide of iron and suitable for use in the manufacture of glass, of $2 per ton.

Total Silica Production in California.

Total silica production in California since the inception of the industry, in 1899, is shown below, being mainly sand:

Year	Tons	Value	Year	Tons	Value
1899	3,000	$3,500	1921	10,569	$49,179
1900	2,200	2,200	1922	9,874	31,016
1901	5,000	16,250	1923	7,964	30,420
1902	4,500	12,225	1924	6,808	35,006
1903	7,725	7,525	1925	12,498	96,780
1904	10,004	12,276	1926	30,010	104,317
1905	9,257	8,121	1927	24,636	94,762
1906	9,750	13,375	1928	14,814	66,679
1907	11,065	8,178	1929	18,686	79,210
1908	9,255	22,045	1930	17,802	71,380
1909	12,259	25,517	1931	43,330	182,769
1910	19,224	18,265	1932	33,997	136,324
1911	8,620	8,672	1933	70,329	266,520
1912	13,075	15,404	1934	70,432	296,643
1913	18,618	21,899	1935	70,835	297,272
1914	28,538	22,688	1936	77,830	310,278
1915	28,904	34,322	1937	84,313	348,987
1916	20,880	48,908	1938	63,167	278,676
1917	19,376	41,166	1939	86,229	349,074
1918	23,257	88,930	1940	101,041	376,723
1919	18,659	101,600			
1920	25,324	96,793	Totals	1,163,644	$4,120,874

SILLIMANITE-ANDALUSITE-KYANITE GROUP

Bibliography: State Mineralogist Reports XX, XXIII, XXIV, XXVII, XXXV-XXXVI. Bulletins 67, 91. Dana's Mineralogy. U. S. Geol. Surv., Prof. Paper 110. U. S. Bureau of Mines, Inform. Circ. 6255. Eng. & Min. Jour.-Press. Vol. 120, pp. 91-94, 1925. Amer. Mineralogist, June, 1924.

Sillimanite and andalusite are both aluminum silicates (Al_2SiO_5), having the same composition and formula, but with slightly different physical characteristics. Though both crystallize in the orthorhombic system, their crystal habits are different. A massive deposit of andalusite, found in Dry Creek Canyon in the White Mountains of the Inyo Range, in Mono County, is being mined by the Champion Spark Plug Company of Detroit, Michigan. The material is shipped East and utilized in the manufacture of porcelain for automobile spark plugs, for other high-tension electric insulators, laboratory ware and porcelain. Porcelain made from these minerals can be subjected to sudden and extreme changes in temperature without damage.

Kyanite is also an aluminum silicate (Al_2SiO_5), of the same chemical composition as andalusite and sillimanite, but crystallizing in the triclinic system. A deposit of kyanite is being mined in Imperial County, near Ogilby, by the Vitrefrax Corporation and shipments made to their refractory plant in Los Angeles.

Dumortierite, though differing somewhat in composition from the above, being a basic aluminum silicate ($HAl_8BSi_3O_{20}$), has proved similar in behavior in ceramic work so that it is now being mixed with

andalusite for electrical porcelains. A deposit of this mineral in Nevada is being mined for that purpose. Occurrences of massive dumortierite are known in Imperial and San Diego counties in this State and there may yet be some commercial possibilities for them.

Total Sillimanite Group Production of California, by Years

Year	Tons	Value	Year	Tons	Value
1922			1933		
1923			1934		
1924			1935		
1925			1936		
1926			1937		
1927			1938		
1928			1940		
1929					
1930			Totals		
1931					
1932					

* Annual details concealed under 'Unapportioned.'

SOAPSTONE and TALC

Bibliography: State Mineralogist Reports XII, XIV, XV, XVII-XXVII (inc.), XXX, XXXIII-XXXVI (inc.). Bulletins 38, 67, 91. U. S. Bur. of Mines, Bulletin 213. Rep. of Investigations, Serial No. 2253, May, 1921.

The total output of talc and soapstone in California during 1940 amounted to 37,433 tons valued at $329,425. This was an increase in amount and a decrease in total value as compared with the 1939 figures, which were 31,820 tons worth $372,078. Of the 1941 production, 36,564 tons were high-grade talc from Inyo and San Bernardino counties and a small amount from Shasta County, which material was utilized mainly in toilet powder, paint, paper, for rubber manufacture, in ceramics, etc. The remaining 859 tons was soapstone and came from Butte, El Dorado, and Tuolumne counties. The 1940 tonnage for soapstone and talc was the largest of any year recorded in California, though the value was less than in 1939.

The 'soapstone' grades were used mainly for roofing granules and as a filler in roofing paper and part also in magnesite cement.

It is reported that California talc has replaced to some extent imported talc in the toilet trade on the basis of quality. The largest production of talc in the United States comes from New York and Vermont and of massive soapstone from Georgia.

During 1940 imports of talc, steatite, etc., totaled 28,363 tons valued at $487,267, as compared with 26,267 tons worth $452,619 during 1939, according to the United States Bureau of Foreign and Domestic Commerce.

The Tariff Act of 1930 places a duty on talc, steatite or soapstone and French chalk, crude or unground, of one-fourth of one cent per pound.

Composition and Varieties.

Talc is hydrous magnesium silicate with the chemical formula $H_2Mg_3(SiO_3)_4$. It is also called soapstone and steatite. The term 'talc' properly includes all forms of the pure mineral, whereas 'stea-

tite' denotes particularly the massive, compact variety, and 'soapstone' the impure, massive forms containing as low as 50% of talc. When pure, talc is soft, having a hardness of 1, but impurities increase the hardness up to 3 or 4. The color varies from pure white and silvery white through gray, green, apple green, to dark green, also yellow, brown, and reddish when impure. It is commonly compact or massive, or in fine granular aggregates, and often in foliated plates or in fibrous aggregates.

Uses.

Although the uses of talc and soapstone are many and varied, some of them are not in general well known nor fully developed; and although few of their uses can justly be considered essential in the sense that no substitute can be used, there are several which are of great importance. The widest use of talc is in the powdered form, and the value depends upon color (whiteness), uniformity, fineness of grain, freedom from grit, 'slip,' and sometimes freedom from lime. The white varieties, free from grit and iron, low in lime, ground to 200-mesh and finer, are largely used as a filler for paper, rubber and paint, and the very highest grade as toilet powder. Ground talc is also used in dressing and coating cloth, in making soap, rope, twine, pipe-covering compounds, heavy lubricants, and polishes, and as a filler in concrete to make it waterproof. Ground talc and soapstone are used in ceramic body for tile and china; for foundry facings, either alone or mixed with graphite and a coarser grade is used in the manufacture of asphalt-coated roofing felts and papers, both as a filler and as a surfacing. Massive close-grained talc, free from iron and grit, is cut into blanks and baked, forming the material used for gas tips and electrical insulation, commonly known as 'lava.' Its hardness, its resistance to heat, acid and alkalies, and its great dielectric strength make it very useful for electric insulation, and no satisfactory substitute for it has been found.

Massive varieties of talc, pyrophyllite, and high grades of soapstone are cut into slate pencils and steel-workers' crayons. 'French chalk' or 'tailer's chalk' is a soft, massive talc. In China, Japan and India, massive talc (steatite) is carved into images and other forms, and is often sold as immitation jade. Soapstone is cut into slabs of 1 and 2 inches in thickness and sold as griddles, footwarmers, and fireless-cooker stones, or fabricated into laundry sinks and tubs, laboratory table tops, hoods, tanks and sinks, electric switchboards, and for other uses in which the properties of resistance to heat, acids and alkalies, and electricity are essential.

Talc Production of California, by Years.

Production was intermittent in the State up to 1912; but there has been a material growth since 1916, as shown in the following table:

Year	Tons	Value	Year	Tons	Value
1893	400	$17,750	1918	11,760	$ 85,534
1894			1919	8,764	115,091
1895	25	375	1920	11,327	221,362
1896			1921	8,752	130,078
1897			1922	13,378	197,186
1898			1923	17,439	252,661
1899			1924	16,179	242,770
1900			1925	15,465	239,084
1901	10	119	1926	17,004	255,645
1902	14	288	1927	16,218	164,744
1903	219	10,124	1928	18,668	251,372
1904	228	2,315	1929	18,676	193,493
1905	300	3,000	1930	15,861	154,258
1906			1931	13,472	109,940
1907			1932	10,690	122,880
1908	3	48	1933	14,451	153,668
1909	33	280	1934	13,920	158,606
1910	740	7,260	1935	17,332	170,830
1911			1936	25,643	309,287
1912	1,750	7,350	1937	29,657	347,772
1913	1,350	6,150	1938	28,346	290,810
1914	1,000	4,500	1939	31,820	372,078
1915	1,663	14,750	1940	37,433	329,425
1916	1,703	9,831			
1917	5,267	45,279	Totals	426,960	$5,096,993

STRONTIUM

Bibliography: State Mineralogist Report XXVI, XXVII, XXXV-XXXVI. Bulletins 67, 91. U. S. G. S. Bull. 540; 660-I.

During 1940 there was a resumption of the mining of strontium minerals in California, with two properties in San Bernardino County, and one each in Imperial and San Diego producing 627 tons of ore valued at $8,686. This material was reported to be used for pyrotechnics (red flares), in the refining of sugar, and in a new alloy of steel. Part of the strontium credited to Imperial County was mined in 1939 but not reported until 1941.

There was a small shipment of strontianite in 1939 from the deposit near Barstow, San Bernardino County, and this was used in a new steel alloy. The last previous production was in 1918, though in that year both celestite ($SrSO_4$), and the carbonate, strontianite ($SrCO_3$) were shipped. The first recorded commercial output of strontium minerals in California was in 1916. The occurrence of the carbonate is particularly interesting and valuable, as it appears to be the only considerable deposit of commercial importance so far opened up in the United States. Shipments reported as averaging 80% $SrCO_3$ have been made. The deposit is associated with deposits of barite near Barstow, San Bernardino County. The carbonate has also been found in massive form near Shoshone, Inyo County. In addition to Imperial County, celestite is found near Calico and Ludlow, and in the Avawatz Mountains in San Bernardino County, but as yet undeveloped.

The principal use for strontium in the United States is in the form of the nitrate in the manufacture of red flares, or Costen and Bengal lights and fireworks.

Production of strontium minerals in California, by years, has been as follows:

Year	Tons	Value	Year	Tons	Value
1916	57	$2,850	1939	2	$2
1917	3,050	37,000	1940	627	8,686
1918	2,900	33,000			
1919			Totals	6,636	$81,618

SULPHUR

Bibliography: State Mineralogist Reports IV, XIII, XIV, XXV, XXXIV, XXXV. Bulletins 38, 67, 91.

During 1940 sulphur was produced from two properties in Inyo County and one in Imperial County to the amount of 8,803 tons valued at $105,619 f.o.b. rail shipping point. This was an increase in both amount and value as compared with the 1939 output, which was 4,811 tons worth $73,741.

Also development work has been done at the Leviathan Mine in Alpine County. This mineral has been found to some extent in Alpine, Colusa, Imperial, Inyo, Kern, Lake, Sonoma, Tehama, and Ventura counties.

Total Production of Sulphur in California.

Sulphur was produced at the famous Sulphur Bank mine in Lake County, during the years 1865-1868 (inc.); following which the property became more valuable for its quicksilver. The Elgin quicksilver mine, near Wilbur Springs, Colusa County, is a similar occurrence.

Photo by Walter W. Bradley

Plant of Leviathan Sulphur Mine, Alpine County.

Production of sulphur in California to date:

Year	Tons	Value	Year	Tons	Value
1865			1934	4,412	$67,656
1866 *	941	$53,500	1935 *	5,308	61,603
1867			1936		
1868 to 1922			1937 *	9,451	120,010
1923 *	185	4,071	1938		
1924			1939	4,811	73,741
1925 to 1928			1940	8,803	105,619
1929					
1930 *	265	9,025	Totals	36,167	$528,063
1931					
1932 *	1,991	32,838			
1933					

* Annual details concealed under 'Unapportioned.'

ZIRCON

Bibliography: State Mineralogist Report XXXIV.

During 1940 there was a small shipment of zircon sand from near Lincoln, Placer County, to the East Coast to be used in a steel alloy. In 1937 for the first time, zircon was reported in commercial quantities, in this State, from the Kaufield dragline dredge near Lincoln. They recovered considerable zircon from their black sand but only shipped a small amount for experimental purposes in the manufacture of refractories and as an abrasive in blast sand.

The chief source of zirconium is the mineral zircon, a zirconium silicate, $ZrSiO_4$. Zircon is used, as a gem, being next to the diamond in brilliancy; as a refractory, molds for steel, insulation in electric heating devices, as a coating on other refractories, coating of welding rods, and in the manufacture of other zirconium compounds.

The metal zirconium is used in radio tubes as an alloy in steel, with copper, etc.

SALINES

Bibliography: State Mineralogist Reports III, XIV, XV, XVII-XXIX (inc.), XXXIII-XXXVI (inc.). Bulletin 24. Spurr and Wormser, "Marketing of Minerals." "Non-Metallic Minerals," by R. B. Ladoo. "Industrial Minerals and Rocks," A. I. M. E., 1937. See also under each substance.

Under this heading are included borax, common salt, soda, potash, and other alkaline salts. The first two have been produced in a number of localities in California, more or less regularly since the early sixties. Except for a single year's absence, soda has had a continuous production since 1894. Potash, magnesium chloride and sulphate, and calcium chloride have been added to the commercial list in recent years, joined in 1926 by bromide, and in 1931 by iodine and in 1938 by the alum minerals. The nitrates are still prospective.

Our main resources of salines are the lake beds of the desert regions of Imperial, Inyo, Kern, Los Angeles, San Bernardino, and San Luis Obispo counties, and the waters of the Pacific Ocean.

The total value of this group showed an increase from $13,178,499 in 1939, to $13,674,519 in 1940.

The following table gives details for each year:

Substance	1939		1940		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Borates	244,819 tons	$5,110,807	212,358 tons	$5,254,154	$143,347+
Magnesium salts	3,895 tons	382,457	4,325 tons	419,666	37,209+
Salt	417,956 tons	1,174,386	462,282 tons	1,290,728	116,347+
Soda	200,049 tons	2,055,608	228,108 tons	2,339,639	284,031+
Unapportioned		[a]4,455,241		[a]4,370,332	84,909—
Total value		$13,178,499		$13,674,519	
Net increase					$496,020+

[a] Includes bromine, calcium chloride, iodine, and potash.

ALUM MINERALS

Bibliography: State Mineralogist Report XXXV.

There are several minerals found in California that are considered natural alums. They are hydrous aluminum sulphates combined with sulphates of iron, potassium, sodium or magnesium. The most important are: Alunite, $K_2Al_6(OH)_{12}(SO_4)_4$, a basic hydrous aluminum and potassium sulphate, and Alunogen, $Al_2(SO_4)_3.16H_2O$, an hydrous aluminum sulphate.

In 1938 a small production and some development work was done on an alunogen deposit near Corona, Riverside County. This output was the first recorded commercial production reported in California. The annual details are combined under 'Unapportioned' item to conceal the output of the single operator. An alunite deposit near Glen Ellen, Sonoma County, was opened up several years ago and some development work has been done in hopes of commercializing this mineral.

BORATES

Bibliography: State Mineralogist Reports III, X, XII-XV (inc.), XVII-XXIII (inc.), XXV-XXVII (inc.), XXXIII-XXXIV, XXXVI. Bulletins 24, 67, 91.

During 1940 there was produced in California a total of 242,419 tons of borate materials compared with 238,390 tons for the year 1939. The material shipped during the year included the sodium borates, kernite (rasorite), kramerite from Kern County; also crystallized borax prepared by evaporation of brines at Searles Lake in San Bernardino County and Owens Lake in Inyo County.

As the crude ore is not sold as such, but is almost entirely refined into borax of commerce before shipping, and because of the fact that the material varied widely in boric acid content, we have recalculated the tonnage to a basis of 40 per cent A.B.A. This is approximately the average A.B.A. content of colemanite material after calcining, and also of the crystallized borax obtained from evaporation of the lake brines.

Recalculated as above, the 1940 production totaled 212,358 tons valued at $5,254,154. This was a decrease in quantity and a slight increase in value from the 1939 output, which was 244,819 tons worth $5,110,807.

The total amount of borates exported from the United States[1] during the year 1940 was 64,313 tons valued at $2,456,523, as compared with 91,139 tons valued at $3,230,304 in 1939.

Total Production of Borate Materials in California

Borax was first discovered in California in the waters of Tuscan Springs in Tehama County, January 8, 1856. Borax Lake in Lake County was discovered in September of the same year by Dr. John A. Veach. This deposit was worked in 1864-1868, inclusive, and during that time produced 1,181,365 pounds of refined borax. The bulk of it was exported by sea to New York. This was the first commercial output of this salt in the United States, and California is still today the leading American producer of borax, having been for many years the sole producer. California is also the premier world source, today.

Photo by Walter W. Bradley

West End Chemical Company plant at West End, on Searles Lake, San Bernardino County.

Production from the dry lake 'playa' deposits of Inyo and San Bernardino counties began in 1873; but it was not until 1887 that the borax industry was revolutionized by the discovery of the colemanite beds at Calico, in San Bernardino County and later similar beds in Inyo and Los Angeles counties. The colemanite deposits of Ventura County were not worked extensively, owing to lack of transportation facilities. Some production of colemanite has been made from deposits opened up in Clarke County, Nevada. Colemanite was in turn, displaced by the discovery in 1926 of kernite (rasorite) a sodium borate and probertite (kramerite) a hydrous sodium, and calcium borate, near Kramer in Kern County. The brines of Searles Lake are likewise an important source.

[1] Monthly Summary of Foreign Commerce of the United States, Department of Commerce, Dec., 1940, Part 1.

The total production of borate materials in California is shown in the following table:

Total Production of Borate Materials in California

Year	Tons	Value	Year	Tons	Value
1864	12	$9,478	1903	34,430	$661,400
1865	126	94,099	1904	45,647	698,810
1866	201	132,538	1905	46,334	1,019,158
1867	220	156,137	1906	58,173	1,182,410
1868	32	22,384	1907	53,413	1,200,913
1869	----------	----------	1908	22,200	1,117,000
1870	----------	----------	1909	16,628	1,163,960
1871	----------	----------	1910	16,828	1,177,960
1872	140	89,600	1911	50,945	1,456,672
1873	515	255,440	1912	42,135	1,122,713
1874	915	259,427	1913	58,051	1,491,530
1875	1,168	289,080	1914	62,500	1,483,500
1876	1,437	312,537	1915	67,004	1,663,521
1877	993	193,705	1916	103,523	2,409,375
1878	373	66,257	1917	109,944	2,561,958
1879	364	65,443	1918	88,772	1,867,908
1880	609	149,245	1919	66,791	1,717,192
1881	690	189,750	1920	127,065	2,794,206
1882	732	201,300	1921	50,136	1,096,326
1883	900	265,500	1922	[2]39,087	1,068,025
1884	1,019	198,705	1923	62,667	1,893,798
1885	942	155,430	1924	52,070	1,599,149
1886	1,285	173,475	1925	46,124	1,526,938
1887	1,015	116,689	1926	47,605	1,625,298
1888	1,405	196,636	1927	72,462	3,043,260
1889	965	145,473	1928	109,722	3,378,552
1890	3,201	480,152	1929	144,678	3,312,085
1891	4,267	640,000	1930	209,869	3,686,817
1892	5,525	838,787	1931	206,405	5,753,037
1893	3,955	593,292	1932	179,356	2,856,470
1894	5,770	807,807	1933	197,495	3,019,513
1895	5,959	595,900	1934	240,696	5,524,262
1896	6,754	675,400	1935	280,249	4,602,064
1897	8,000	1,080,000	1936	313,389	5,911,093
1898	8,300	1,153,000	1937	326,099	6,206,619
1899	20,357	1,139,882	1938	276,144	5,014,237
1900	25,837	1,013,251	1939	244,819	5,110,807
1901	22,221	982,380	1940	212,358	5,254,154
1902	[1]17,202	2,234,994	Totals	4,535,219	$114,245,863

[1] Refined borax. [2] Recalculated to 40% 'anhydrous boric acid' equivalent beginning with 1922.

BROMINE

The first commercial production of bromine and bromine compounds was begun during 1926 by the California Chemical Corporation in its plant at Chula Vista, San Diego County, from salt-works bittern waters. This same plant has been recovering magnesium chloride for a number of years. Bromine is also now being made at a similar bittern-water plant at Newark, Alameda County, and beginning in 1940 from brines at Searles Lake, San Bernardino County. The 1940 output, an increase in amount and value as compared with that of 1939, was the largest annual production on record in California; annual details of which are concealed under the 'Unapportioned' item so as not to reveal the production of the single company which operated both plants.

The total commercial production of bromine in California is as follows:

Year	Tons	Value	Year	Tons	Value
1926			1932		
1927 *	158	$120,480	1933 *	559	$146,547
1928			1934		
1929			1935		
1930 *	802	552,933	1936 *	805	191,465
1931			1937		
			1938 *	914	327,823
			1939		
			1940	1,579	528,245
			Totals	4,817	$1,867,493

*Annual details concealed under 'Unapportioned.'

CALCIUM CHLORIDE

Bibliography: U. S. Geol. Surv., Min. Res. 1919, Pt. II. Engineering and Contracting, Roads and Streets, monthly issue, Feb. 6, 1924. 'How to Maintain Roads,' manual of instruction of Dow Chemical Company.

Calcium chloride is hygroscopic, that is, it has an affinity for water. This property is taken advantage of by utilizing this salt as a drying agent. During 1940 the production of calcium chloride in California came from one plant in San Bernardino County. The annual details are combined under the 'Unapportioned' item to conceal the output of the operator. The 1940 output showed an increase in both amount and value as compared with that of 1939.

Total Calcium Chloride Production in California

Commercial production of calcium chloride in California was first reported to the State Mining Bureau in 1921, from two plants in San Bernardino County, being obtained as a by-product in the refining of salt from deposits in certain of the desert dry lakes. Total production in California is shown in the following tabulation:

Year	Tons	Value	Year	Tons	Value
1921	683	$22,980	1930 *	9,688	$103,237
1922 *	1,204	26,580	1931		
1923			1932 *	3,103	15,500
1924 *	10,988	328,876	1933		
1925			1934 *	4,048	16,196
1926 *	34,195	508,748	1935		
1927			1936 *	7,227	35,073
1928 *	12,020	114,080	1937		
1929			1938 *	7,279	40,182
			1939	*	*
			1940		
			Totals	90,435	$1,211,452

* Annual details concealed under 'Unapportioned.'

IODINE

Bibliography: State Mineralogist Reports XXXIV, XXXVI. U. S. Bureau of Mines I. C. 6387.

In 1940 the output of iodine in California came from two plants in Los Angeles County and showed an increase in both quantity and

value over 1939. The annual details for 1940 are concealed under the 'Unapportioned' item to conceal the output of either operator. The combined 1939–1940 production came from three plants in Los Angeles County, and amounted to 795,510 pounds, valued at $862,931.

Total Iodine Production in California

Iodine was first produced in California during 1917 to 1921 as a by-product of potash which was reduced from kelp in an experimental station of U. S. Department of Agriculture at Summerland, but after the armistice the demand for these minerals decreased so that the plant in Santa Barbara County closed. In 1929 the General Salt Company erected a plant which reduces iodine from the waste waters of certain deep oil wells in the Long Beach field. During 1933 two more plants started operation, making a total of three producing plants in the State.

Year	Pounds	Value
1929 1931 1933 *	696,297	$1,374,311
1934	355,279	423,016
1935 1936 *	487,401	379,702
1937 1938 *	624,318	508,119
1939 1940 *	795,510	862,931
Totals	2,958,805	$3,521,079

*Annual details concealed under 'Unapportioned.'

MAGNESIUM SALTS

Bibliography: State Mineralogist Reports XX, XXI, XXV-XXVI (inc.), XXXIV. Bulletin 91. 'Dictionary of Applied Chemistry,' by Thorpe. U. S. Geol. Surv., Min. Res. of P. S.

During 1940 there was an output of magnesium salts in California coming from one plant in San Diego County, and two in San Mateo County amounting to 4,325 short tons valued at $419,666, and consisted of the chloride, carbonate, hydroxide, and oxide. The 1939 output amounted to 3,895 tons worth $382,457, which was also the chloride, carbonate, hydroxide, and oxide. Also coming from Alameda County was a tonnage of magnesium hydroxide but not included in the above totals as this material was used as magnesite and therefore included under that substance. The chloride was nearly all sold for use in magnesite stucco and cement mixtures (Sorel cement), also some for road liquor. The carbonate, or bulky white powder, was used as a heat-insulating material, as a substitute for magnesite, as a filler for rubber, paper, paint, etc., and in medicines, in tooth paste, in face powder and as a polish for metal and glass. The sulphate market in past years was utilized for medicinal and bath purposes. The material coming from San Diego County was residual bitterns from the salt plants and was in part marketed in the liquid form carrying from 35% to 67% $MgCl_2$ and in part as dry crystals, while that from Alameda and San Mateo counties was magnesium carbonate, magnesium hydroxide, and magnesium oxide, obtained by precipitation from sea water.

The average value reported from the chloride produced in California in 1940 was approximately $29.84 per ton, f. o. b. plant, and in 1939 approximately $28.80 per ton, f. o. b. plant.

Total Production of Magnesium Salts in California

Commercial production of magnesium chloride in California was begun in 1916 by some of the salt companies, from the residual bitterns obtained during the evaporation of sea water for its sodium chloride. In addition, some magnesium sulphate, or 'epsom salts' has also been made, but in smaller amount, and magnesium carbonate by a patented process, direct from sea water.

The total production of magnesium salts in California, since the beginning of the industry here, is shown in the following tabulation:

Year	Tons	Value	Year	Tons	Value
1916	851	$6,407	1929	4,914	$333,906
1917	1,064	34,973	1930*		
1918	1,008	29,955	1931	2,749	217,979
1919	1,616	82,457	1932*		
1920	3,150	107,787	1933	2,073	159,660
1921	4,153	106,140	1934	2,325	194,642
1922	3,036	89,788	1935	2,755	235,531
1923	3,662	116,031	1936	3,798	347,838
1924	4,823	145,883	1937	3,867	316,669
1925	4,221	132,553	1938	24,176	469,636
1926	4,881	124,470	1939	3,895	382,457
1927*	6,241	139,589	1940	4,325	419,666
1928*			Totals	93,613	$4,194,017

* Annual details concealed under 'Unapportioned.'

NITRATES

Bibliography: State Mineralogist Reports XV, XXV, XXVI, XXVII, XXXIV. Bulletins 24, 67, 91. U. S. G. S., Press Bulletin No. 373, July, 1918. Smithsonian Inst., Publ. No. 2421, 1916.

Nitrates of sodium, potassium and calcium have been found in various places in the desert regions of the State, but no deposit of commercial value has been developed as yet. It is hoped that a closer search may some day be rewarded by workable discoveries. At present the principal commercial source of nitrates is the Chilean saltpeter (sodium nitrate) deposits in South America.

The fixation of atmospheric nitrogen electrically has been accomplished successfully in Germany and Scandinavia. The possibilities of cheap hydroelectric power in California make the subject one of interest to us, as we have also the natural raw materials and chemicals to go with the explosives. Sodium and potasium cyanides can be made by fixation of atmospheric nitrogen electrically.

POTASH

Bibliography: State Mineralogist Reports XV, XVIII, XX, XXII, XXV-XXVII (inc.) XXXIV. Bulletins 24, 67, 91. U. S. G. S., Min. Res. 1913, 1914, 1915. Senate Doc. No. 190, 62 Congress, 2d Session. Mining & Sci. Press, Vol. 112, p. 155; Vol. 114, p. 789. Eng. & Min. Jour.-Press, Vol. 117, p. 557, Apr. 5, 1924.

The 1940 production of potash in California came from a single operator in San Bernardino County, the details of which are concealed under the 'Unapportioned' item. This was principally chloride and the product averaged 60% equivalent K_2O content. The material was sold mainly for fertilizer manufacture.

Imports of crude potash minerals and salts in the United States during 1940 according to the U. S. Bureau of Foreign and Domestic Commerce amounted to 246,065 long tons valued at $5,148,852, compared with 210,818 long tons worth $5,752,225 in 1939. These materials consisted mainly of 'manure salts,' crude chloride (muriate) and sulphate, and kainite, all of which are admitted duty free.

Quotations (July 7, 1941) were $36.25 per ton c. i. f. Atlantic and Gulf ports for high grade sulphate (90%-95%).

Photo by Walter W. Bradley

Coring a new well on Searles Lake, San Bernardino County, by American Potash and Chemical Company for potash-borax-soda-bearing brine.

Total Production of Potash in California

Potash production began commercially in California in 1914, with a small yield from kelp. Practically all of the output now comes from deposits of potash-bearing residues and brines in the old lake beds of the desert regions, particularly Searles Lake, San Bernardino County. A small amount has been made from salt-works bitterns, and for a time there was some from Portland cement dust. Some also has been obtained from molasses distillery-slops char.

The annual amounts and values of these potash materials, since their beginning in California in 1914, have been as follows:

Year	Tons	Value	Year	Tons	Value
1914	10	$460	1928*	178,680	$5,522,350
1915	1,076	19,391	1929*		
1916	17,808	663,605	1930*	172,263	5,500,536
1917	129,022	4,202,889	1931*		
1918	49,381	6,808,976	1932*	153,147	3,932,721
1919	28,118	2,415,963	1933*		
1920	26,298	1,465,463	1934*	355,604	3,750,809
1921	14,806	390,210	1935*		
1922	17,776	584,388	1936*	358,417	6,988,922
1923	29,597	709,836	1937*		
1924	33,107	747,407	1938*	383,981	9,057,866
1925	36,355	829,770	1939*		
1926	32,884	812,285	1940	*	*
1927	67,340	1,952,852	Totals	1,985,770	$55,361,699

* Annual details concealed under 'Unapportioned.'

SALT

Bibliography: State Mineralogist Reports II, XII-XV (inc.), XVII-XXIII (inc.), XXV-XXVII (inc.), XXXIV-XXXVI (inc.). Bulletins 24, 67, 91. U. S. Geol. Survey, Bull. 669. U. S. Bur. of Mines, Bull. 146.

Most of the salt production in California is obtained by evaporation of water of the Pacific Ocean, plants being located on the shores of San Francisco, Monterey, and San Diego bays, and at Long Beach. Additional amounts are derived from lakes and lake beds in the desert regions (in part, rock salt), mainly in Imperial, Kern, and San Bernardino counties, and evaporation of alkaline lake water in Modoc County. A small amount of valuable medicinal salts has been obtained by evaporation of the water of Lake Mono, Mono County, and from a mineral spring in Butte County.

During 1940 there was an output in California of 462,282 short tons of salt valued at $1,290,728, compared with 417,956 tons worth $1,174,386.

There were sixteen operating plants in 1940; three in Alameda County; two each in Imperial and San Bernardino counties; and one each in Butte, Kern, Los Angeles, Mono, Modoc, Monterey, Orange, San Diego, and San Mateo counties.

The average value reported for salt produced in California during 1940 was $2.79 per ton f.o.b. plant, compared with $2.75 in 1939, $2.82 in 1937, $3.08 in 1936, and $3.36 in 1935.

Production of Salt in California, by Years

Although salt has been made in California since the early '60's, there are no definite or authenticated records for the earlier years before the beginning of the statistical tabulations by the State Mining Bureau.

Amount and value of annual production of salt in California from 1887 is shown in the following tabulation:

Year	Tons	Value	Year	Tons	Value
1887	28,000	$112,000	1915	169,028	$368,737
1888	30,800	92,400	1916	186,148	455,695
1889	21,000	63,000	1917	227,825	584,373
1890	8,729	57,085	1918	212,076	806,328
1891	20,094	90,303	1919	233,994	896,963
1892	23,570	104,788	1920	230,638	972,648
1893	50,500	213,000	1921	197,989	832,702
1894	49,131	140,087	1922	223,238	819,187
1895	53,031	150,576	1923	275,979	1,130,670
1896	64,743	153,244	1924	318,800	1,159,137
1897	67,851	157,520	1925	284,068	949,826
1898	93,421	170,855	1926	311,761	1,124,978
1899	82,654	149,588	1927	263,028	639,127
1900	89,338	204,754	1928	340,580	1,024,656
1901	126,218	366,376	1929	392,039	2,665,436
1902	115,208	205,876	1930	347,945	1,167,487
1903	102,895	211,365	1931	330,951	1,233,567
1904	95,968	187,300	1932	256,353	918,480
1905	77,118	141,925	1933	321,312	1,251,024
1906	101,650	213,228	1934	332,194	1,222,810
1907	88,063	310,967	1935	365,711	1,230,480
1908	121,764	281,469	1936	398,249	1,227,505
1909	155,680	414,708	1937	370,431	1,044,325
1910	174,920	395,417	1938	395,746	1,099,737
1911	173,332	324,255	1939	417,956	1,174,386
1912	185,721	383,370	1940	462,282	1,290,728
1913	204,407	462,681			
1914	223,806	583,553	Totals	10,494,933	$33,632,682

SODA

Bibliography: State Mineralogist Reports XII, XIII, XV, XVII, XVIII, XX, XXII, XXIII, XXV-XXIX (inc.), XXXIV, XXXVI. Bulletins 24, 67, 91. U. S. Geol. Surv., Bull. 717.

The production of sodium salts in California in 1940 included soda ash, and trona, from plants at Owens Lake, Inyo County; and soda ash, salt cake, and trona (sequi-carbonate, a double salt of Na_2CO_3 and $NaHCO_3$) from Searles Lake, San Bernardino County. The plant on Dale Lake near Amboy, San Bernardino County, started operations during the year and should make shipments of salt cake in 1941. There were no shipments of salt cake (sulphate) from Carrizo Plains, San Luis Obispo County.

Shipments in 1940 amounted to 228,108 short tons valued at $2,339,639, as compared with 200,049 tons worth $2,055,608 in 1939. The 1940 output of soda was the largest annual production reported in California.

The soda ash was used mainly in the manufacture of soap, glass, paper, oil refining, sugar refining, and chemicals; and the trona for metallurgical purposes. The salt cake or sodium sulphate was used in the manufacture of paper, glass, and in chemicals.

Photo by Walter W. Bradley

Natural Soda Products Co., evaporating sprays and pond, at Keeler, on Owens Lake, Inyo County.

Soda Production of California, by Years

The total output, showing amount and value of these materials in California since the inception of the statistical records of the State Mining Bureau, is given in the table which follows:

Year	Tons	Value	Year	Tons	Value
1894	1,530	$20,000	1918	20,447	$855,423
1895	1,900	47,500	1919	21,294	721,958
1896	3,000	65,000	1920	32,407	1,164,898
1897	5,000	110,000	1921	14,828	438,996
1898	7,000	154,000	1922	20,084	573,661
1899	10,000	250,000	1923	34,885	764,284
1900	1,000	50,000	1924	32,536	711,796
1901	8,000	400,000	1925	48,625	947,649
1902	7,000	50,000	1926	63,333	1,305,802
1903	18,000	27,000	1927	62,571	1,478,239
1904	12,000	18,000	1928	80,838	1,469,297
1905	15,000	22,500	1929	90,646	1,838,657
1906	12,000	18,000	1930	90,122	1,627,344
1907			1931	78,701	1,217,811
1908	9,600	14,400	1932	58,017	826,369
1909	7,712	11,593	1933	70,598	1,019,130
1910	8,125	11,862	1934	99,380	1,219,561
1911	9,023	52,887	1935	125,504	1,341,045
1912	7,200	37,094	1936	144,314	1,412,788
1913	1,861	24,936	1937	153,685	1,461,057
1914	6,522	115,396	1938	178,105	2,023,610
1915	5,799	83,485	1939	200,049	2,055,608
1916	10,593	264,825	1940	228,108	2,339,639
1917	24,505	928,578			
			Totals	2,241,447	$31,591,678

CHAPTER SEVEN

BY COUNTIES

Introductory.

The State of California includes a total area of 158,297 square miles, of which 156,803 square miles are of land (according to 1940 census resurvey). The maximum width is 235 miles, the minimum 148 miles, and the length from the northwest corner to the southeast corner is 775 miles. The State is divided into fifty-eight counties. The 1940 census figures show a total population for California of 6,907,387. Minerals of commercial value exist in every county, and during 1940 some active production was reported to the State Division of Mines from all of the fifty-eight.

Rank of Counties in Mineral Yield, 1940.

Of the ten leading counties in point of total value of mineral output during 1940, the first five, viz., Los Angeles, Kern, Fresno, Ventura, Orange; and Kings, seventh, and Santa Barbara, ninth, owe their position to petroleum and natural gas. Los Angeles County, due to crude oil, led all other counties in 1940 and is credited with 29% of the State's total mineral value, holding this position since 1923 when it passed Kern County, which led previously for many years. San Bernardino (sixth) owes its position to cement, borates, and potash. Nevada (eighth) owes its position to gold; and Sacramento (tenth) to gold.

There were thirty-three counties having a mineral production valued in excess of a million dollars in 1940, in seven each of which petroleum and cement were important items; in fifteen, gold; in six, natural gas; in two each, borates and miscellaneous stone; and one each, brick and hollow building tile, copper, diatomite, potash, quicksilver, salt, soda, and tungsten.

In point of variety and diversity San Bernardino County led all others in 1940 with thirty-one different mineral substances on its commercial list, followed by: Los Angeles County with twenty-one; Inyo County with twenty; Kern County with nineteen; Riverside and San Diego counties each with sixteen; Fresno County with fifteen; Imperial, Orange, and Placer counties each with fourteen; Santa Barbara County with thirteen; El Dorado and Tuolumne counties each with eleven; and Amador, Butte, Calaveras, Contra Costa, Monterey, Napa, Sacramento, San Luis Obispo, Santa Clara, and Shasta each with ten.

County	Value	County	Value
1. Los Angeles	$98,183,754	31. Mariposa	$1,224,336
2. Kern	62,855,732	32. San Joaquin	1,146,912
3. Fresno	22,103,968	33. Tuolumne	1,032,567
4. Ventura	20,647,881	34. Sierra	969,323
5. Orange	17,575,147	35. Lake	884,427
6. San Bernardino	15,772,742	36. San Diego	845,207
7. Kings	13,649,445	37. Napa	829,589
8. Nevada	11,351,165	38. Solano	709,435
9. Santa Barbara	8,045,351	39. Mono	666,280
10. Sacramento	5,928,834	40. San Luis Obispo	491,329
11. Amador	4,284,886	41. Imperial	461,180
12. Calaveras	4,233,835	42. Sonoma	432,760
13. Yuba	4,035,614	43. Monterey	307,177
14. Riverside	3,918,747	44. Tulare	220,065
15. Alameda	3,697,648	45. Marin	151,800
16. Santa Clara	3,229,052	46. Humboldt	133,590
17. Inyo	2,855,646	47. Madera	110,074
18. Shasta	2,799,796	48. Yolo	109,820
19. Santa Cruz	2,779,306	49. Mendocino	109,110
20. Plumas	2,743,608	50. Sutter	94,054
21. Butte	2,722,816	51. Modoc	93,042
22. San Mateo	2,620,611	52. San Francisco	52,205
23. Merced	2,514,323	53. Tehama	51,880
24. Siskiyou	2,219,203	54. Colusa	45,337
25. El Dorado	2,094,405	55. Del Norte	24,689
26. Placer	2,023,484	56. Alpine	18,211
27. Contra Costa	1,960,631	57. Glenn	16,891
28. Trinity	1,772,327	58. Lassen	14,869
29. Stanislaus	1,558,205		
30. San Benito	1,401,496	Total value	$342,825,817

ALAMEDA

Land area: 732 square miles.
Population: 513,011 (1940 census).
Location: East side of San Francisco Bay.
County seat: Oakland.
References: State Mineralogist Report XVII : XVIII : XX : XXVI (Oct., 1929); XXXV.

Alameda, while in no sense one of the 'mining counties' came fifteenth on the list of counties as to value, with a mineral production for 1940 worth $3,697,648, and had eight different substances. This was an increase over the 1939 output which was valued at $2,778,587.

Commercial production for 1940 was as follows:

Substance	Amount	Value
Clay (pottery)	6,860 tons	$10,349
Stone, miscellaneous	----	1,559,545
Unapportioned *	----	2,127,754
Total value		$3,697,648

* Includes brick and hollow building tile, bromine, gypsum, lime, magnesite (Magnesium salts reduced from sea water), salt.

ALPINE

Land area: 776 square miles.
Population: 323 (1940 census).
Location: On eastern border of State, south of Lake Tahoe.
County seat: Markleeville.
References: State Mineralogist Report XV : XVII : XVIII : XXVII (Oct., 1931) : XXV.

Alpine County ranked fifty-sixth in value of output for 1940 which was $18,211, compared with $7,328 in 1939.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Gold	430 fine ozs.	$15,050
Silver	1,160 fine ozs.	825
Unapportioned *	----	2,336
Total value		$18,211

* Includes quicksilver and miscellaneous stone.

AMADOR

Land area: 601 square miles.
Population: 8,973 (1940 census).
Location: East-central part of State—Mother Lode District.
County seat: Jackson.
References: State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXII (April, 1927) : XXX : XXXV.

Amador County ranked eleventh as to value of mineral output for 1940, with ten different substances worth $4,284,886 compared with $4,314,573 in 1939.

Amador at one time led the State in gold production, though exceeded in 1920-1923 and in 1926-1927 by Yuba and Nevada counties; but in 1925 and 1928 by Yuba only, in 1929-1930 by Nevada only, and in 1931-1936 and 1939-1940 by Nevada and Sacramento.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Clay (pottery)	34,282 tons	$67,164
Copper	20,643 lbs.	2,333
Gold	117,776 fine ozs.	4,122,160
Lead	11,459 lbs.	573
Silver	23,081 fine ozs.	16,413
Stone (miscellaneous)	------	28,796
Unapportioned *	------	47,447
Total value		$4,284,886

* Includes brick, platinum, volcanic ash.

BUTTE

Land area: 1722 square miles.
Population: 42,840 (1940 census).
Location: North-central portion of State.
County seat: Oroville.
References: State Mineralogist Report XV : XVII : XVIII : XXIV : XXVI (Oct., 1930) : XXXI (Jan., 1936).

Butte County ranked twenty-first in regard to value of mineral output in 1940 and seventh in respect to gold, with ten different substances, having a total value of $2,722,816 compared with $2,217,721 in 1939.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Copper	6,349 lbs.	$717
Gold	72,681 fine ozs.	2,543,835
Silver	21,035 fine ozs.	14,958
Stone (miscellaneous)	-----	159,483
Unapportioned *	-----	3,823
Total value		$2,722,816

* Includes mineral water, natural gas, platinum, salt (medical), soapstone.

CALAVERAS

Land area: 1,027 square miles.
Population: 8,221 (1940 census).
Location: East-central portion of State—Mother Lode District.
County seat: San Andreas.
References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXI : XXXII (July, 1936) : XXXV.

Calaveras County ranked twelfth in California in regard to value of mineral output in 1940, and fifth in respect to gold, with a total of $4,233,835, as compared with $5,392,940 in 1939.

Commercial production for 1940 consisting of ten different substances, was as follows:

Substance	*Amount*	*Value*
Copper	7,561 lbs.	$854
Gold	86,754 fine ozs.	3,036,390
Silver	17,648 fine ozs.	12,550
Stone (miscellaneous)	-----	14,411
Unapportioned *	-----	1,169,630
Total value		$4,233,835

* Includes cement, chromite, clay (pottery), lead, mineral water, platinum.

COLUSA

Land area: 1,140 square miles.
Population: 9,788 (1940 census).
Location: Sacramento Valley.
County seat: Colusa.
References: State Mineralogist Report XIV : XVII : XVIII : XXV (April, 1929) : XXXV.

Colusa County ranked fifty-fourth in regard to the value of mineral output in 1940, with five different mineral substances, worth a total of $45,337, as compared with $20,149 in 1939.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Gold	1 fine oz.	$35
Stone (miscellaneous)	--	41,909
Unapportioned *	--	3,393
Total value		$45,337

* Includes mineral water, quicksilver, sandstone.

CONTRA COSTA

Land area: 714 square miles.
Population: 100,450 (1940 census).
Location: East side of San Francisco Bay.
County seat: Martinez.
References: State Mineralogist Report XVII : XVIII : XXIII (Jan., 1927) : XXXV.

Contra Costa County stands twenty-seventh on the list in respect to value of mineral output for 1940, with ten different substances worth $1,960,631, as compared with $2,206,131 in 1939.

Commercial production for 1940 was as follows:

Substance	Value
Stone (miscellaneous)	$278,477
Unapportioned *	1,682,154
Total value	$1,960,631

* Includes brick and hollow building tile, cement, clay (pottery), coal, diatomite, mineral water, quicksilver, silica (glass sand).

DEL NORTE

Land area: 1024 square miles.
Population: 4,745 (1040 census).
Location: Extreme northwest corner of State.
County seat: Crescent City.
References: State Mineralogist Report XIV : XVII : XXI (July, 1925) : XXIX (Jan.-April, 1933) : XXXIV : XXXV.

Del Norte County was in fifty-fifth place as to mineral production for 1940 with five different substances worth $24,689, as compared with $13,101 in 1939.

Commercial production for 1940 was as follows:

Substance	Amount	Value
Gold	50 fine ozs.	$1,750
Silver	4 fine ozs.	3
Unapportioned *	--	22,936
Total value		$24,689

* Includes chromite, miscellaneous stone.

EL DORADO

Land area: 1753 square miles.
Population: 13,229 (1940 census).
Location: East-central portion of the State, northernmost of the Mother Lode counties.
County seat: Placerville.
References: State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXII (Oct., 1926) : XXXI : XXXIV (July, 1938) : XXXV.

El Dorado, which contains the location where gold in California was first heralded to the world, comes twenty-fifth on the list of counties ranked according to value for 1940, with eleven different mineral substances worth $2,094,405. In addition to the segregated figures here given, a large tonnage of limestone was formerly shipped for use in cement manufacture, the value being included in the State's total for cement. The 1939 output was valued at $3,277,679.

Commercial production for 1940 was as follows:

Substance	Amount	Value
Copper	1,630 lbs.	$184
Gold	38,331 fine ozs.	1,341,585
Limestone	261,713 tons	308,708
Silver	5,216 fine ozs.	3,709
Stone (miscellaneous)	------	12,947
Unapportioned	------	427,272
Total value		$2,094,405

* Includes chromite, lead, lime, slate, soapstone.

FRESNO

Land area: 5950 square miles.
Population: 178,565 (1940 census).
Location: South-central portion of State.
County seat: Fresno.
References: State Mineralogist Report XIV : XVII: XVIII : XXV (July, 1929) : XXXV.

Fresno County, third in importance as a mineral producer among the counties of California, reports an output for 1940 of fifteen different mineral substances, with a total value of $22,103,968, as compared with the 1939 value of $21,275,300.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Gold	984 fine ozs.	$34,440
Natural gas	61,400,088 M. cu. ft.	3,139,811
Petroleum	17,377,685 bbls.	18,562,902
Silver	231 fine ozs.	164
Stone (miscellaneous)	----------	197,455
Unapportioned	----------	169,196
Total value		$22,103,968

* Includes brick and hollow building tile, chromite, clay (pottery), coal, feldspar, granite, gypsum, quicksilver, tungsten ore.

GLENN

Land area: 1259 square miles.
Population: 12,195 (1940 census).
Location: West side of Sacramento Valley.
County seat: Willows.
References: State Mineralogist Report XIV : XVII : XVIII : XXXV.

Glenn County stands fifty-seventh as a mineral producing county of the State for 1940, and owes its position mainly to the presence of large deposits of sand and gravel, much of which is used as railroad ballast.

Commercial production for 1940 totaled $16,891, which is a decrease from $54,591, the 1939 total.

HUMBOLDT

Land area: 3634 square miles.
Population: 45,812 (1940 census).
Location: Northwestern portion of State, bordering on Pacific Ocean.
County seat: Eureka.
References: State Mineralogist Report XIV : XVII : XVIII : XXI (July, 1925) : XXXV.

Humboldt County ranked forty-sixth in the value of its mineral output among the counties of the State for 1940 with six different mineral substances valued at $133,590, compared with the 1939 output worth $133,150.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Gold	591 fine ozs.	$20,685
Silver	86 fine ozs.	61
Stone (miscellaneous)	---	105,825
Unapportioned *	---	7,019
Total value		$133,590

* Includes brick, clay (pottery), natural gas.

IMPERIAL

Land area: 4089 square miles.
Population: 59,740 (1940 census).
Location: Extreme southeast corner of the State.
County seat: El Centro.
References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXII (April, 1926) : XXXIV - XXXVI (inc.).

Imperial County ranked forty-first in total value of mineral output for 1940, with fourteen different mineral substances, worth $461,180, compared with $822,271 for 1939.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Copper	11,201 lbs.	$1,266
Gold	7,219 fine ozs.	252,665
Silver	2,623 fine ozs.	1,865
Stone, miscellaneous	-----	64,553
Unapportioned *	-----	140,831
Total value		$461,180

* Includes carbon dioxide, gems (Iceland spar), gypsum kyanite, limestone, magnesite, salt, strontium, sulphur.

INYO

Land area: 10,019 square miles.
Population: 7625 (1940 census).
Location: Lies on eastern border of State, north of San Bernardino County.
County seat: Independence.
References: State Mineralogist Report XV : XVII : XVIII : XX : XXII (Oct., 1926) : XXVII : XXX : XXXIII : XXXIV (Oct., 1938) : XXXV : XXXVI.

Inyo County's mineral output for 1940 reached a total value of $2,855,646, having twenty different mineral substances and standing 17th among the counties of the State as to value of production. The 1939 yield was worth $1,614,597.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Antimony	11,521 lbs.	$1,613
Copper	212,038 lbs.	23,960
Gold	11,373 fine ozs.	415,555
Lead	2,130,330 lbs.	106,576
Pumice	3,974 tons	20,690
Silver	86,658 fine ozs.	61,623
Stone (miscellaneous)	--------	41,579
Zinc	130,821 lbs.	8,242
Tungsten ore	64,882 units	1,440,889
Unapportioned *	--------	734,979
Total value		$2,855,646

* Includes bentonite, borates, dolomite, iron ore, limestone, mica schist, molybdenum ore, quicksilver, soda, sulphur, talc.

KERN

Land area: 8003 square miles.
Population: 135,124 (1940 census).
Location: South-central portion of State.
County seat: Bakersfield.
References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXV (Jan., 1929) : XXIX (July-Oct., 1933) : XXX : XXXIV - XXXVI.

Kern County, because of its immensely productive oil fields, for many years stood preeminent among all counties of California in the value of its mineral output. It was surpassed by Los Angeles and Orange counties in 1923, but by Los Angeles only in 1924-1940, for which petroleum is responsible; it also rates sixth as a gold producing county. The 1940 production consisted of nineteen different mineral substances valued at $62,855,732 compared with the 1939 output worth $62,105,687.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Antimony	43,298 lbs.	$6,062
Copper	2,617 lbs.	296
Gold	82,493 fine ozs.	2,887,255
Lead	27,133 lbs.	1,357
Gypsum	70, 043 tons	93,964
Natural gas	79,409,481 M. cu. ft.	4,257,590
Petroleum	60,660,165 bbls.	50,835,439
Silver	831,949 fine ozs.	591,608
Stone (miscellaneous)	----------	282,576
Unapportioned *	----------	3,899,585
Total value		$62,855,732

* Includes bentonite, borates, brick, calcium silicate, cement, clay (pottery and oil well drilling mud), volcanic ash, quicksilver, salt.

KINGS

Land area: 1559 square miles.
Population: 35,168 (1940 census).
Location: South-central portion of the State.
County seat: Hanford.
References: State Mineralogist Report XIV : XVII : XVIII : XXVI (Oct., 1930) : XXXV.

Kings County, previous to the discovery of Kettleman Hills oil fields in 1928, had little or no mineral output, but in 1929 it ranked ninth in total value of annual mineral production, seventh in 1930, 1938 and 1940, third in 1931, eighth in 1936-1937, sixth in 1939.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Natural gas	36,016,041 M. cu. ft.	$2,018,422
Petroleum	9,212,121 bbls.	11,625,696
Quicksilver	23 flasks	3,827
Stone (miscellaneous)	----------	1,500
Total value		$13,649,445

LAKE

Land area: 1278 square miles
Population: 8,069 (1940 census).
Location: About fifty miles north of San Francisco Bay and the same distance inland from the Pacific Ocean.
County seat: Lakeport.
References: State Mineralogist Report XIV : XVII : XVIII : XX : XXV (July, 1929) : XXXIV : XXXV.

Lake County was in thirty-fifth place as to the value of mineral output for 1940, with four different mineral substances, worth $884,427 compared with $451,575 in 1939.

Commercial production in 1940 was as follows:

Substance	*Amount*	*Value*
Mineral water	20,588 gals.	$10,902
Quicksilver	4,966 flasks	845,592
Stone (miscellaneous)	-----	27,883
Other minerals	-----	50
Total value		$884,427

LASSEN

Land area: 4531 square miles.
Population: 14,479 (1940 census).
Location: Northeast portion of State.
County seat: Susanville.
References: State Mineralogist Report XV : XVII : XVIII : XIX : XXV (Jan., 1929) : XXX : XXXII (Oct., 1936).

Lassen County was in fifty-eighth place as a mineral producer for 1940, with an output of $14,869, compared with $46,277 which was the value for the previous year.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Gold	77 fine ozs.	$2,695
Silver	83 fine ozs.	59
Stone (miscellaneous)	--	11,963
Unapportioned *		152
Total value		$14,869

* Includes copper and granite.

LOS ANGELES

Land area: 4067 square miles.
Population: 2,785,643 (1940 census).
Location: One of the southwestern coast counties.
County seat: Los Angeles.
References: State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXIII (July, 1927) : XXX : XXXIII (July, 1937) : XXXIV-XXXVI.

The mineral production for Los Angeles County for the year 1940 amounted in value to $98,183,754, as compared with the 1939 total worth $113,577,646. This accounted for 29% of the entire State's total

for 1940 and ranked Los Angeles first in the State as a mineral producer.

Commercial production for 1940 consisting of twenty-one substances was as follows:

Substance	*Amount*	*Value*
Brick	58,924 M.	$1,187,040
Building tile (hollow)	3,446 tons	32,238
Clay (pottery)	26,046 tons	18,316
Copper	3,138 lbs.	355
Gold	7,384 fine ozs.	258,440
Mineral water	7,150,460 gals.	475,089
Natural gas	98,109,911 M. cu. ft.	6,462,762
Petroleum	90,696,857 bbls.	85,342,723
Silver	2,957 fine ozs.	2,103
Stone (miscellaneous)	----------	3,569,457
Unapportioned *	----------	835,231
Total value		$98,183,754

* Includes cement, diatomite, dolomite, granite (mica schist), iodine, limestone, marble (dolomite flagstone), salt, sandstone, slate, titanium.

MADERA

Land area: 2112 square miles.
Population: 23,314 (1940 census).
Location: East-central portion of State.
County seat: Madera.
References: State Mineralogist Report XIV : XVII : XVIII : XXIV (Oct., 1928) : XXX : XXXI : XXXIV.

Madera County was in forty-seventh place as a mineral producer for 1940, with an output of seven different mineral substances valued at $110,074, compared with $119,831 for 1939.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Gold	1,400 fine ozs.	$49,000
Lead	2,860 lbs.	143
Silver	478 fine ozs.	340
Stone (miscellaneous)	----	22,549
Unapportioned*	----	38,042
Total value		$110,074

* Includes granite, pumice and volcanic ash.

MARIN

Land area: 529 square miles.
Population: 52,907 (1940 census).
Location: Adjoins San Francisco on the north.
County seat: San Rafael.
References: State Mineralogist Report XIV : XVII : XVIII : XXII (July, 1926) : XXIX : XXXV.

Marin County had forty-fifth place as to the value of mineral output for 1940, with three different mineral substances. The total was $151,800 compared with $133,756 in 1939.

Commercial production included mineral water, crushed rock, sand and gravel.

MARIPOSA

Land area: 1453 square miles.
Population: 5,605 (1940 census).
Location: Most southerly of the Mother Lode counties. East central portion of State.
County seat: Mariposa.
References: State Mineralogist Report XIV : XVII : XVIII : XXIV (April, 1928) : XXXI (Jan., 1935) : XXXV.

Mariposa County is one of the distinctly *mining* counties of the State, although it stands but thirty-first on the list of counties in regard to the value of its mineral output for 1940, with a total of $1,224,336, as compared with $1,755,776 for 1939. Mariposa County is also the source of a large tonnage of limestone annually, which is otherwise credited to cement manufacture in Merced County.

Commercial production with seven different mineral substances for 1940 was as follows:

Substance	*Amount*	*Value*
Copper	7,616 lbs.	$861
Gold	27,134 fine ozs.	949,690
Lead	27,725 lbs.	1,386
Silver	9,303 fine ozs.	6,615
Stone (miscellaneous)	-----	109,598
Other minerals	-----	156,186
Total value		$1,224,336

MENDOCINO

Land area: 3452 square miles.
Population: 27864 (1940 census).
Location: Joins Humboldt County on the south and bounded by the Pacific Ocean on the west.
County seat: Ukiah.
References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXXV.

Mendocino County's mineral output for 1940 was valued at $109,110 which gave it a rank of forty-ninth among the counties of the State as a mineral producer with $47,691 for 1939.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Gold	2 fine ozs.	$70
Stone (miscellaneous)	--	107,507
Unapportioned *	--	1,533
Total value		$109,110

* Includes carbon dioxide and natural gas.

MERCED

Land area: 1995 square miles.
Population: 46,988 (1940 census).
Location: About the geographical center of the State.
County seat: Merced.
References: State Mineralogist Report XIV : XVII : XVIII : XXI (April, 1925) : XXXI (Jan., 1935) : XXXV.

Merced County ranked twenty-third as to the value of mineral output for 1940, with six different mineral substances worth $2,514,323, compared with $2,611,896 for 1939.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Gold	51,907 fine ozs.	$1,816,745
Silver	4,891 fine ozs.	3,478
Unapportioned *	-----	694,100
Total value		$2,514,323

* Includes cement, platinum, miscellaneous stone.

MODOC

Land area: 3823 square miles.
Population: 8,713 (1940 census).
Location: The extreme northeast corner of the State.
County seat: Alturas.
References: State Mineralogist Report XV : XVII : XVIII : XXV (Jan., 1929) : XXX : XXXII (Oct., 1936) : XXXV.

Modoc County, in fifty-first place for 1940, with seven different mineral substances, reported a commercial production as follows:

Substance	*Amount*	*Value*
Gold	7 fine ozs.	$245
Silver	4 fine ozs.	3
Stone (miscellaneous)	--	79,564
Unapportioned *	--	13,230
Total value		$93,042

* Includes gems (irridescent obsidian), pumice and scoria, salt.

MONO

Land area: 3030 square miles.
Population: 2,299 (1940 census).
Location: is bordered by the State of Nevada on the east and is about in the central portion of the State measured on a north and south line.
County seat: Bridgeport.
References: State Mineralogist Report XV : XVII : XVIII : XX : XXIII (Oct., 1927) : XXX : XXXIV : XXXV : XXXVI (April, 1940).

Mono County, in thirty-ninth place with nine different mineral substances, reported a commercial production for 1940 as follows:

Substance	*Amount*	*Value*
Copper	113,873 lbs.	$12,868
Gold	12,214 fine ozs.	427,490
Lead	140,666 lbs.	7,033
Silver	146,682 fine ozs.	104,307
Stone (miscellaneous)	------	37,322
Unapportioned *	------	77,260
Total value		$666,280

* Includes clay (pottery), pumice, salt, tungsten ore.

MONTEREY

Land area: 3330 square miles.
Population: 73,032 (1940 census).
Location: West-central portion of State, bordering on Pacific Ocean.
County seat: Salinas.
References: State Mineralogist Report XV : XVII : XVIII : XIX : XXI (Jan., 1925) : XXXI : XXXIV : XXXV.

Monterey County had ten different mineral substances during 1940, having a total value of $307,177 as compared with $229,058 for 1939.

In forty-third place, commercial production for 1940 was as follows:

Substance	*Value*
Stone (miscellaneous)	$257,691
Unapportioned *	49,486
Total value	$307,177

* Includes diatomite, gems (Jasper), gold, gypsum, quicksilver, salt, sandstone, silver.

NAPA

Land area: 783 square miles.
Population: 28,503 (1940 census).
Location: Directly north of San Francisco Bay—one of the 'bay counties.'
County seat: Napa.
References: State Mineralogist Report XIV : XVII : XVIII : XX : XXV (April, 1929) : XXXV.

In 1940 the value of Napa County's mineral output was $829,589 placing it in thirty-seventh place on the list of counties, as compared with $714,895 for 1939.

With ten different mineral substances, commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Mineral water	127,681 gals.	$16,250
Quicksilver	1,479 flasks	245,757
Unapportioned *	------	567,582
Total value		$829,589

* Includes gems (onyx), copper, gold, silver, pumice, sandstone, miscellaneous stone.

NEVADA

Land area: 974 square miles.
Population: 19,283 (1940 census).
Location: North of Lake Tahoe on the eastern border of the State.
County seat: Nevada City.
References: State Mineralogist Report XVI : XVII : XVIII : XIX : XX : XXVI (April, 1930) : XXXI : XXXII : XXXV : XXXVII (July, 1941).

Nevada County, one of the mountain counties of California, for some years alternated with Amador in the gold lead, but both were

passed by Yuba in 1918-1921, also 1923. In 1922, 1924, 1929 to 1938, 1940 Nevada led all counties in gold output, though it held third place in 1925 and 1928, and second place in 1926 and 1927. Nevada County stands eighth on the list of counties in regard to value of its mineral output for 1940 with eight different mineral substances worth $11,351,165 as compared with $11,468,556 for 1939.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Copper	39,403 lbs.	$4,453
Gold	313,269 fine ozs.	10,964,415
Lead	8,593 lbs.	430
Silver	428,955 fine ozs.	305,049
Stone (miscellaneous)	------	40,718
Unapportioned *	------	36,100
Total value		$11,351,165

* Includes barite and granite.

ORANGE

Land area: 795 square miles.
Population: 130,760 (1940 census).
Location: Southwest portion of the State, bordering Pacific Ocean.
County seat: Santa Ana.
References: State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXI (Jan., 1925) : XXXI : XXXV.

Orange County, in fifth place as to value of mineral output for 1940, produced fourteen mineral substances, worth $17,575,147 compared with $18,850,782 in 1939.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Clay (pottery)	45,555 tons	$151,005
Copper	1,235 lbs.	140
Gold	43 fine ozs.	1,505
Lead	38,571 lbs.	1,928
Natural gas	15,812,089 M. cu. ft.	1,071,924
Petroleum	17,998,175 bbls.	16,190,394
Silver	15,172 fine ozs.	10,789
Stone (miscellaneous)	----------	122,331
Zinc	51,267 lbs.	3,230
Unapportioned *	----------	21,901
Total value		$17,575,147

* Includes brick, mineral water, quicksilver, salt, silica (glass sand).

PLACER

Land area: 1395 square miles.
Population: 28,108 (1940 census).
Location: Eastern border of State directly west of Lake Tahoe.
County seat: Auburn.
References: State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXIII (July, 1937) : XXXI : XXXII (Jan., 1936).

Placer County, in twenty-sixth place, with fourteen different mineral substances, had a commercial production for 1940 as follows, compared with $1,710,738 for the previous year:

Substance	Amount	Value
Clay (pottery)	57,323 tons	$81,709
Copper	10,578 lbs.	1,195
Gold	51,806 fine ozs.	1,813,210
Lead	43,371 lbs.	2,169
Silver	60,029 fine ozs.	42,687
Stone (miscellaneous)	-----	48,054
Unapportioned *	-----	34,460
Total value		$2,023,484

* Includes brick and tile, chromite, granite, mineral water, platinum, silica (quartz), zircon sand.

PLUMAS

Land area: 2594 square miles.
Population: 11,548 (1940 census).
Location: Northeastern border of State, south of Lassen County.
County seat: Quincy.
References: State Mineralogist Report XVI : XVII : XVIII : XIX : XX : XXIV (Oct., 1928) : XXIX : XXX : XXXIII (April, 1937).

Plumas County's mineral output for 1940 with seven different mineral substances was valued at $2,743,608 as compared with $2,265,956 in 1939.

In twentieth place, commercial production for 1940 was as follows:

Substance	Amount	Value
Copper	10,587,611 lbs.	$1,196,400
Gold	37,202 fine ozs.	1,302,070
Lead	88,162 lbs.	4,408
Silver	254,956 fine ozs.	181,302
Stone (miscellaneous)	------	59,427
Other mineral	------	1
Total value		$2,743,608

RIVERSIDE

Land area: 7240 square miles.
Population: 105,524 (1940 census).
Location: Southern portion of State.
County seat: Riverside.
References: State Mineralogist Report XV : XVII : XVIII : XX : XXV (Oct., 1929) : XXX : XXXI : XXXIV - XXXVI.

Riverside is the fourth county in the State in size and the fourteenth in regard to the total value of mineral output for 1940. Within its borders are included mountain, desert, and agricultural land. In point of variety Riverside County showed sixteen different mineral substances commercially produced in 1940 with a total value of $3,918,747, as compared with the 1939 output which was valued at $3,187,902.

Commercial production for 1940 was as follows:

Substance	Amount	Value
Clay (pottery)	61,291 tons	$124,338
Copper	22,269 lbs.	2,516
Gold	2,376 fine ozs.	83,160
Lead	536,457 lbs.	26,823
Silver	31,652 fine ozs.	22,510
Stone (miscellaneous)	------	381,803
Unapportioned *	------	3,277,597
Total value		$3,918,747

* Includes brick and hollow building tile, cement, granite, gypsum, limestone, mineral water, sandstone, silica (glass sand), paving blocks.

SACRAMENTO

Land area: 983 square miles.
Population: 170,333 (1940 census).
Location: North-central portion of State.
County seat: Sacramento.
References: State Mineralogist Report XV : XVII : XVIII : XX : XXI (Jan., 1925) : XXXI.

Sacramento stands tenth among the counties of the State as a mineral producer; the output, principally gold, for 1940 being valued at $5,928,834, as compared with the 1939 production worth $5,875,597. In regard to gold output alone, this county ranks second, being exceeded by Nevada, the Sacramento product coming from the dredges. With ten mineral substances, commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Gold	158,237 fine ozs.	$5,538,295
Silver	9,951 fine ozs.	7,076
Stone (miscellaneous)	------	280,780
Unapportioned *	------	102,683
Total value		$5,928,834

* Includes brick and hollow building tile, clay (pottery), granite, natural gas, platinum, paving blocks.

SAN BENITO

Land area: 1392 square miles.
Population: 11,392 (1940 census).
Location: West-central portion of State.
County seat: Hollister.
References: State Mineralogist Report XV : XVII : XVIII : XX : XXII (April, 1926) : XXXIV : XXXV.

San Benito County ranked thirteenth among the counties in regard to the value of total mining production for 1940, having an output worth $1,401,496 as compared with $547,093 for the previous year.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Quicksilver	6,164 flasks	$1,062,539
Unapportioned *	----	338,957
Total value		$1,401,496

* Includes dolomite, gems, miscellaneous stone.

Note: Cement mill at San Juan started operation end June, 1941.

SAN BERNARDINO

Land area: 20,157 square miles.
Population: 161,108 (1940 census).
Location: Southeastern portion of State.
County seat: San Bernardino.
References: State Mineralogist Report XV : XVII : XVIII : XIX : XXVI (July, 1930) : XXVII (July, 1931) : XXX : XXXIV-XXXVI.

San Bernardino, by far the largest county in the State in area, ranked sixth in regard to the value of mineral output for 1940 with a total of $15,772,742, as compared with $14,664,598, the total for 1939.

San Bernardino, for several years (except for 1918) had led all other counties in the State in point of variety of minerals, producing commercially in 1940 a total of thirty-one different substances.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Bentonite	4,733 tons	$104,612
Clay (pottery)	7,043 tons	55,751
Copper	50,913 lbs.	5,753
Gold	14,726 fine ozs.	515,410
Lead	31,375 lbs.	1,569
Silver	145,319 fine ozs.	103,338
Stone (miscellaneous)	------	212,475
Talc	21,955 tons	174,414
Unapportioned *	------	14,599,420
Total value		$15,772,742

* Includes antimony, borates, brick, bromine, calcium chloride, cement, feldspar, granite, lime, limestone, lithia salts, manganese, marble, mineral water, petroleum, potash, quicksilver, salt, silica (quartz), soda, strontium minerals, tungsten ore.

SAN DIEGO

Land area: 4221 square miles.
Population: 289,348 (1940 census).
Location: Extreme southwest corner of State.
County seat: San Diego.
References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXI (July, 1925) : XXX : XXXV (Jan., 1939) : XXXVI.

San Diego ranked thirty-sixth in the total value of its mineral output for the year 1940 with sixteen different mineral substances on the commercial list. The value for 1940 was $845,207 as compared with the 1939 output worth $633,147.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Gold	485 fine ozs.	$16,975
Granite	6,330 cu. ft.	14,233
Silver	180 fine ozs.	128
Stone (miscellaneous)	----	550,997
Unapportioned *	----	262,874
Total value		$845,207

* Includes brick and hollow building tile, bromine, clay (pottery), feldspar, gems, magnesium salts, mineral water, salt, tube-mill pebbles, strontium.

SAN FRANCISCO

Land area: 46½ square miles.
Population: 634,536 (1940 census).
County seat: San Francisco.
References: State Mineralogist Report XVII : XVIII : XX : XXV (April, 1929) : XXXV.

Surprising as it may appear at first glance, San Francisco County is listed among the mineral-producing sections of the State, actual production consisting mainly of crushed rock, sand, gravel, mineral water and gold and silver from beach sands.

In fifty-second place, commercial production for 1940 was as follows:

Substance	Amount	Value
Gold	70 fine ozs.	$2,450
Silver	7 fine ozs.	5
Unapportioned *	--	49,750
Total value		$52,205

* Includes mineral water, miscellaneous stone.

SAN JOAQUIN

Land area: 1448 square miles.
Population: 134,207 (1940 census).
Location: Central portion of State.
County seat: Stockton.
References: State Mineralogist Report XIV : XVII : XVIII : XXI (April, 1925).

San Joaquin County reported a mineral production for 1940 having a total value of $1,146,912, as compared with $1,104,898 for 1939.

In thirty-second place, commercial production for 1940 was as follows:

Substance	Amount	Value
Gold	9,405 fine ozs.	$329,175
Natural gas	9,037,712 M. cu. ft.	574,452
Silver	911 fine ozs.	648
Stone (miscellaneous)	--------	175,438
Unapportioned *	--------	67,199
Total value		$1,146,912

* Includes brick and hollow building tile, clay (pottery) platinum.

SAN LUIS OBISPO

Land area: 3334 square miles.
Population: 33,246 (1940 census).
Location: Bordered by Kern County on the east and the Pacific Ocean on the west.
County seat: San Luis Obispo.
References: State Mineralogist Report XV : XVII : XVIII : XXI (Oct., 1925) : XXXI (Oct., 1935) : XXXV.

The total value of the mineral production of San Luis Obispo County in 1940, with ten different mineral substances, was $491,329 as compared with $174,124 in 1939.

In fortieth place, commercial production for 1940 was as follows:

Substance	Amount	Value
Gold	10 fine ozs.	$350
Quicksilver	1,470 flasks	243,832
Stone (miscellaneous)	----	70,231
Unapportioned *	----	176,916
Total value		$491,329

* Includes brick and hollow building tile, clay (oil well drilling mud), limestone, mineral water, petroleum, volcanic ash, sandstone.

SAN MATEO

Land area: 447 square miles.
Population: 111,782 (1940 census).

Location: Peninsula, adjoined by San Francisco on the north.
County seat: Redwood City.
References: State Mineralogist Report XVII : XVIII : XXV (April, 1929) : XXIX : XXXV.

San Mateo County had a mineral output in 1940 of seven different substances, having a total value of $2,620,611 as compared with the 1939 production worth $2,418,895.

In twenty-second place, commercial production for 1940 was as follows:

Substance	*Value*
Stone (miscellaneous)	$76,497
Unapportioned *	2,544,114
Total value	$2,620,611

* Incudes cement, limestone (shells), magnesium salt, petrolçum, salt.

SANTA BARBARA

Land area: 2740 square miles.
Population: 70,555 (1940 census).
Location: Southwestern portion of State, adjoining San Luis Obispo on the south.
County seat: Santa Barbara.
References: State Mineralogist Report XV : XVII : XVIII : XIX : XXI (Oct., 1925) : XXXII : XXXV.

Santa Barbara County owes its position of ninth place in the State in regard to its mineral output to the presence of productive oil fields within its boundaries. The total value of its mineral production during the year 1940 was $8,045,351 as compared with the 1939 output of $8,911.006.

With thirteen different substances, commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Copper	7,765 lbs.	$877
Gold	1 fine ozs.	35
Natural gas	4,726,148 M. cu. ft.	305,203
Petroleum	10,270,200 bbls.	6,365,757
Quicksilver	500 flasks	81,223
Silver	7 fine ozs.	5
Stone (miscellaneous)	----------	102,476
Unapportioned *	----------	1,189,775
Total value		$8,045,351

* Includes bituminous rock, brick and hollow building tile, diatomite, marble (limestone for building), mineral water.

SANTA CLARA

Land area: 1328 square miles.
Population: 174,949 (1940 census).
Location: West-central portion of State.
County seat: San Jose.
References: State Mineralogist Report XVII : XVIII : XX : XXVI (Jan., 1930) : XXIX : XXXV.

Santa Clara County reported a mineral output for 1940 of $3,229,052, as compared with $716,346, the figure for 1939.

In sixteenth place with ten mineral substances, commercial production for 1940 was as follows:

Substance	Amount	Value
Limestone (including shells)	190,753 tons	$227,340
Quicksilver	1,034 flasks	170,837
Stone (miscellaneous)	------	235,720
Unapportioned *	------	2,595,155
Total value		$3,229,052

* Includes brick, cement, gems (Jasper), lime, magnesite, petroleum.

SANTA CRUZ

Land area: 435 square miles.
Population: 45,057 (1940 census).
Location: Bordering Pacific Ocean, just south of San Mateo County.
County seat: Santa Cruz.
References: State Mineralogist Report XVII : XVIII : XXII (Jan., 1926) : XXIX.

The mineral output of Santa Cruz County, a portion of which is itemized below, amounted to a total of $2,779,306 for 1940, giving the county a standing of nineteenth among all others in the State in this regard. The 1939 figure was $3,140,742.

Commercial production for 1940 was as follows:

Substance	Amount	Value
Gold	19 fine ozs.	$665
Limestone	30,807 tons	73,875
Silver	6 fine ozs.	4
Stone (miscellaneous)	-----	141,602
Unapportioned *	-----	2,563,160
Total value		$2,779,306

* Includes bituminous rock, cement, iron ore, lime.

SHASTA

Land area: 3858 square miles.
Population: 28,800 (1940 census).
Location: North-central portion of State.
County seat: Redding.
References: State Mineralogist Report XIV : XVII : XVIII : XIX : XXII (April, 1926) : XXIX (Jan., April, 1933) : XXX : XXXIV : XXXV (April, 1939).

Shasta County stood eighteenth in California among the mineral-producing counties in 1940, with an output valued at $2,799,796, as compared with 1939 production worth $2,058,547.

With ten mineral substances, commercial production for 1940 was as follows:

Substance	Amount	Value
Copper	1,714,324 lbs.	$193,719
Gold	42,261 fine ozs.	1,479,135
Lead	1,995 lbs.	100
Silver	92,102 fine ozs.	65,495
Stone (miscellaneous)	--------	782,172
Unapportioned *	--------	279,175
Total value		$2,799,796

* Includes platinum, pyrite, sandstone, talc.

SIERRA

Land area: 923 square miles.
Population: 3025 (1940 census).
Location: Eastern border of State just north of Nevada County.
County seat: Downieville.
References: State Mineralogist Report XVI : XVII : XVIII : XX : XXV (April, 1929) : XXXI.

Sierra County reported a mineral production of $969,323 in 1940, which was mainly gold, as compared with the 1939 output worth $871,212.

In thirty-fourth place, commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Copper	1,367 lbs.	$154
Gold	27,391 fine ozs.	958,685
Silver	4,013 fine ozs.	2,854
Other minerals	-----	7,630
Total value		$969,323

SISKIYOU

Land area: 6256 square miles.
Population: 28,598 (1940 census).
Location: Extreme north-central portion of State, next to Oregon boundary.
County seat: Yreka.
References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXI (Oct., 1925) : XXVIII (Jan., 1931) : XXIX : XXX : XXXI (July, 1935) : XXXIV : XXXV.

Siskiyou, fifth county in California in regard to size, located in highly mineralized and mountainous country, ranks twenty-fourth in regard to mineral output with eight mineral substances for 1940. The 1939 production was valued at $1,847,687.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Gold	51,109 fine ozs.	$2,068,815
Pumice and Scoria	637 tons	2,250
Silver	9,353 fine ozs.	6,651
Stone (miscellaneous)	-----	102,923
Unapportioned *	-----	38,564
Total value		$2,219,203

* Includes copper, mineral water, platinum.

SOLANO

Land area: 822 square miles.
Population: 49,118 (1940 census).
Location: Touching San Francisco Bay on the northeast.
County seat: Fairfield.
References: State Mineralogist Report XIV : XVII : XXIII (April, 1927) : XXXV.

Solano, while mostly valley land, produced mineral substances during the year 1940 to the total value of $709,435, ranking in thirty-

eighth place among the counties of the State, compared with the 1939 output worth $640,024.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Natural gas	8,210,646 M. cu. ft.	$666,790
Unapportioned *	-------	42,145
Total value		$709,435

* Includes travertine, quicksilver, miscellaneous stone.

SONOMA

Land area: 1577 square miles.
Population: 69,052 (1940 census).
Location: South of Mendocino County, bordering on the Pacific Ocean.
County seat: Santa Rosa.
References: State Mineralogist Report XIV : XVII : XVIII : XXII (July, 1926) : XXXV.

Sonoma County ranked forty-second among the counties of California during 1940 with a mineral output valued at $432,760, as compared with $329,069, the 1939 figure.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Mineral water	12,028 gals.	$3,288
Quicksilver	1,144 flasks	188,467
Stone (miscellaneous)	-----	229,033
Other minerals	-----	11,972
Total value		$432,760

STANISLAUS

Land area: 1450 square miles.
Population: 74,866 (1940 census).
Location: Center of State, bounded on south by Merced County.
County seat: Modesto.
References: State Mineralogist Report XIV : XVII : XVIII : XXI (April, 1925) : XXXV.

Gold has usually been the chief mineral product of Stanislaus County, but it was exceeded in 1918-1919 by manganese, and in 1921-1923 and 1925-1930 by miscellaneous stone. This county for 1940 ranked twenty-ninth in the State in regard to minerals, with an output valued at $1,558,205, as compared with $1,069,730 in 1939.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Gold	36,464 fine ozs.	$1,276,240
Silver	2,597 fine ozs.	1,847
Stone (miscellaneous)	-----	61,306
Unapportioned *	-----	218,812
Total value		$1,558,205

* Includes chromite, clay (pottery), magnesite, manganese, platinum.

SUTTER

Land area: 608 square miles.
Population: 18,680 (1940 census).
Location: Bounded by Butte County on the north and Sacramento on the south.
County seat: Yuba City.
References: State Mineralogist Report XV : XVII : XVIII.

Sutter is one of only two counties in the State which for a number of years reported no commercial output of some kind of mineral substance. In 1917 some crushed rock was taken out, from the Marysville Buttes, also in 1925-1928, and 1937-1938.

There has been some utilization of natural gas and clay. Coal is found here, but no deposits of it have been placed on a productive basis. During 1940 there was a commercial output of pottery clay and natural gas, having a total value of $94,054, which ranked it fiftieth as a mineral-producing county.

TEHAMA

Land area: 2893 miles.
Population: 14,316 (1940 census).
Location: North-central portion of the State, bounded on the north by Shasta.
County seat: Red Bluff.
References: State Mineralogist Report XV : XVII : XVIII : XIV : XXIV (July, 1928).

Tehama County stood fifty-third among the mineral-producing counties of the State for 1940, with an output valued at $51,880, compared with $82,094 in 1939. Commercial production in 1940 was crushed rock, sand and gravel.

TRINITY

Land area: 3166 square miles.
Population: 3970 (1940 census).
Location: Northwestern portion of State.
County seat: Weaverville.
References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXII (Jan., 1926) : XXIX (Jan., April, 1933) : XXX : XXXIV : XXXV : XXXVII (Jan., 1941).

Trinity County's output of minerals was valued at $1,772,327 for 1940, as compared with the 1939 figure of $1,514,951, mainly due to gold which gives the county a rank of twenty-eighth for the year.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Gold	49,433 fine ozs.	$1,730,155
Silver	4,937 fine ozs.	4,222
Unapportioned *	-----	37,950
Total value		$1,772,327

* Includes copper, lead, platinum, quicksilver, miscellaneous stone.

TULARE

Land area: 4856 square miles.
Population: 107,152 (1940 census).
Location: Bounded by Inyo on the east, Kern on the south, Fresno on the north.
County seat: Visalia.
References: State Mineralogist Report XV : XVII : XVIII : XX : XXXVI.

Tulare County stands forty-fourth on the list of mineral-producing counties for 1940, with eight different mineral substances, having a total value of $220,065, as compared with $452,547 for 1939.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Gold	16 fine ozs.	$560
Silver	7 fine ozs.	5
Stone (miscellaneous)	--	14,164
Unapportioned *	--	205,336
Total value		$220,065

* Includes brick and hollow building tile, clay (pottery), natural gas, tungsten.

TUOLUMNE

Land area: 2190 square miles.
Population: 10,887 (1940 census).
Location: East-central portion of State—Mother Lode District.
County seat: Sonora.
References: State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXIV (Jan., 1928) : XXXIV : XXXV.

Tuolumne County ranks thirty-third among the counties of the State relative to its total value of mineral output for 1940, with eleven different substances. This county ranks first as a producer of marble in the State. The mineral production for 1940 was valued at $1,032,567, as compared with $669,844 for 1939.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Copper	4,649 lbs.	$525
Gold	21,932 fine ozs.	767,620
Limestone	19,904 tons	46,112
Silver	4,916 fine ozs.	3,496
Stone (miscellaneous)	-----	60,620
Unapportioned *	-----	154,194
Total value		$1,032,567

* Includes lead, lime, marble, slate, soapstone.

VENTURA

Land area: 1878 square miles.
Population: 69,685 (1940 census).
Location: Southwestern portion of State, bordering on Pacific Ocean.
County seat: Ventura.
References: State Mineralogist Report XV: XVII: XVIII: XX: XXI: XXVIII (July-Oct., 1932).

Ventura is fourth in the State in respect to the value of its mineral output for 1940. The 1940 mineral production was worth $20,647,881, as compared with the 1939 output valued at $20,773,214.

With eight different mineral substances, commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Gold	44 fine ozs.	$1,540
Natural gas	38,081,099 M cu. ft.	1,982,242
Petroleum	17,038,470 bbls.	18,525,316
Silver	7 fine ozs.	5
Stone (miscellaneous)	----------	128,244
Unapportioned *	----------	10,534
Total value		$20,647,881

* Includes clay (oil-well drilling mud), granite (volcanic tuff).

YOLO

Land area: 1017 square miles.
Population: 27,243 (1940 census).
Location: Sacramento Valley, bounded by Sutter on the east and Colusa on the north.
County seat: Woodland.
References: State Mineralogist Report XIV : XVII : XVIII : XXXV.

Yolo County, in forty-eighth place, had a commercial production for 1940 as follows, compared with $63,143 the preceding year:

Substance	*Value*
Stone (miscellaneous)	$24,208
Unapportioned *	85,612
Total value	$109,820

* Includes natural gas and quicksilver.

YUBA

Land area: 639 square miles.
Population: 17,034 (1940 census).
Location: Lies west of Sierra and Nevada counties; south of Plumas.
County seat: Marysville.
References: State Mineralogist Report XV : XVII : XVIII : XX : XXVI (July, 1930) : XXXI.

Yuba County ranked thirteenth among the counties of the State as a mineral producer and ninth in respect to gold, which is obtained mainly by dredges. The 1939 output was valued at $3,192,056.

Commercial production for 1940 was as follows:

Substance	*Amount*	*Value*
Gold	111,025 fine ozs.	$3,885,875
Silver	10,329 fine ozs.	7,345
Stone (miscellaneous)	------	134,819
Other minerals	------	7,575
Total value		$4,035,614

CHAPTER VIII

DIRECTORY OF PRODUCERS OF METALLIC AND NON-METALLIC MINERALS IN CALIFORNIA 1940

NOTE.—The producers of natural gas and petroleum will be found in the quarterly Summary of Operations, California Oil Fields, for October, November, and December, 1940 (Vol. 26, No. 2).

ANTIMONY

Mine	Operator	Address	Location of mine
Inyo County			
	Harry Briggs	1200 Rives-Strong Bldg., Los Angeles	Inyo Mts.
Kern County			
Alice Mine	R. L. Coughran	Isabella	Isabella
Bull Dog Mine	Walter S. Bilderback	Lake Hughes	Mojave
	Chas. B. Fife	Frazier Park	Bakersfield
	K. J. Hines	1536 N. Western, Los Angeles	Lebec
Miller Antimony Mine	R. C. Golden	1913 Eden, Glendale	Bodfish

BARYTES

Operator	Address	Location of mine
Mariposa County		
Baroid Sales Division, National Lead Co.	830 Ducommun St., Los Angeles	El Portal
Nevada County		
Industrial Minerals & Chemical Co., Spanish Mine	836 Gilman St., Berkeley	Washington

BENTONITE (FULLER'S EARTH)

Operator	Address	Location of pit
Inyo County		
W. R. Cantley	Olancha	Olancha
Coen Companies, Inc.	1610 S. Broadway, Los Angeles	Death Valley
Kern County		
Filtrol Co.	1755 Downey Rd., Los Angeles	Tehachapi
Muroc Clay Co.	5525 Randolph St., Maywood	Muroc
San Bernardino County		
Baroid Sales Division, National Lead Co.	830 Ducommun St., Los Angeles	Hector
Walter Becker	Box 43, Red Mountain	Red Mountain
Kennedy Minerals Co.	2550 E. Olympic Blvd., Los Angeles	
Pacific Bentonite Mine, Louis Martinez	Box 374, Red Mountain	Red Mountain
J. H. Stone	Barstow	Barstow

BITUMINOUS ROCK

Operator	Address	Location of mine
Santa Barbara County		
Higgins Quarry, D. A. Sattler, Lessee	856 Arguello Rd., Santa Barbara	Carpinteria
Santa Cruz County		
Calrock Asphalt Co.	525 Market St., San Francisco	Majors

BORATES

Operator	Address	Location of property
Inyo County		
Pacific Alkali Co.	1209 Pacific Mutual Bldg., Los Angeles	Bartlett
United States Borax Co.	510 W. 6th St., Los Angeles	Death Valley
Kern County		
Pacific Coast Borax Co.	510 W. 6th St., Los Angeles	Kramer
San Bernardino County		
American Potash and Chemical Corp.	Trona	Trona
West End Chemical Co.	Latham Square Bldg., Oakland	West End

BROMINE

Operator	Address	Location of property
Alameda County		
Westvaco Chlorine Prod. Corp.	Newark	Newark
San Bernardino County		
American Potash & Chem. Co.	Trona	Trona
San Diego County		
Westvaco Chlorine Prod. Corp.	Newark	San Diego

CALCIUM CHLORIDE

Operator	Address	Location of mine
San Bernardino County		
California Rock Salt Co.	2465 Hunter St., Los Angeles	Amboy

CALCIUM SILICATE

Operator	Address	Location of property
Kern County		
Johns-Manville Product Corp.	Box 198, Long Beach	Code

CARBON DIOXIDE GAS

Operator	Address	Location of wells
Imperial County		
National Dry Ice Co.	1225 E. 8th St., Los Angeles	Niland
Natural Carbonic Prod., Inc.	748 E. Washington Blvd., Los Angeles	Niland
Mendocino County		
Sun-Glo Dryice Corp., H. DeLotty	Box 33, Ukiah	Hopland

CEMENT

Operator	Address	Location of mill
Calaveras County		
Calaveras Cement Co.	315 Montgomery St., San Francisco	San Andreas
Contra Costa County		
Henry Cowell Lime and Cement Co.	2 Market St., San Francisco	Cowell
Kern County		
Monolith Portland Cement Co.	Bartlett Bldg., Los Angeles	Monolith
Los Angeles County		
Blue Diamond Corp.	1650 S. Alameda St., Los Angeles	Los Angeles
Merced County		
Yosemite Portland Cement Co.	Merced	Merced
Riverside County		
Riverside Cement Co.	621 S. Hope St., Los Angeles	Riverside
San Bernardino County		
California Portland Cement Co.	601 W. Fifth St., Los Angeles	Colton
Southwestern Portland Cement Co.	503 Roosevelt Bldg., Los Angeles	Victorville
San Mateo County		
Pacific Portland Cement Co.	417 Montgomery St., San Francisco	Redwood City
Santa Clara County		
The Permanente Corp.	Box 29, San Jose	Permanente
Santa Cruz County		
Santa Cruz Portland Cement Co.	Crocker Bldg., San Francisco	Davenport

Operator	Address	Location of mine
Calaveras County		
Chas. Gillis	Route 1, Sonora	Sonora
Del Norte County		
High Plateau Group, Eugene Brown	O'Brian, Oregon	Crescent City
French Hill Mine, C. H. McClendon	Crescent City	Crescent City
El Dorado County		
Rustless Mining Corp., H. F. Byram	924 22d St., Sacramento	Folsom
Fresno County		
Bradley & Ekstrom	320 Market St., San Francisco	Tollhouse
Placer County		
Occidental Metals Co.	519 California St., San Francisco	Colfax
Daniel Sullivan*	Alta	Dutch Flat
Plumas County		
L. Eddelbuttel*	Quincy	Quincy
Stanislaus County		
West Coast Chrome Co., Chas. Hall and J. A. Thoronson	Box 512, Patterson	Patterson

* Mined chromite in 1940 but did not ship.

CLAY

(Including producers of crude clay; and manufacturers of brick, tile, porcelain, etc.)

Operator	Remarks	Address	Location of plant or pit
Alameda County			
California Faience Co., W. B. Bragdon	a	1335 Hearst Ave., Berkeley	Berkeley
California Pottery Co.	a, c	Niles	Niles
N. Clark & Sons	a, b	116 Natomas St., San Francisco	Alameda
Interlocking Tile Co.	a, c	Niles	Niles
Kraftile Co.	a, b	Niles	Niles
M & S Tile Co.	a, c	Decoto	Decoto
Merrit Supply Co.	a	1289 Cedar St., Berkeley	Berkeley
F. R. Stuve	a, b, c	Box 26, Mt. Eden	Mt. Eden
Tesla Clay Co., Isabell Bros., Lorin Isabell	c	75 W. Whittier St., Tracy	Tesla
Walrich Pottery	a	1285 Hearst Ave., Berkeley	Berkeley
Westinghouse Elec. & Mfg. Co., Emeryville Porcelain Works	a	62d and Green Sts., Emeryville	Emeryville
Woolenius Tiles & Mantels	a	1315 2d St., Berkeley	Berkeley
Amador County			
M. J. Bacon	c	Ione	Carbondale
Cal. Mineral Products Co., Ione Clay and Sand Pit	c, f	Kohl Bldg., San Francisco	Ione
N. Clark & Sons	c	116 Natomas St., San Francisco	Ione
Clay Corp. of California	c	1267 Russ Bldg., San Francisco	Ione
Ione Fire Brick Co., J. T. Roberts, Mgr.	b, c	1267 Russ Bldg., San Francisco	Ione
Preston School of Industry	b	Ione	Ione
Calaveras County			
California Pottery Co.	c	Niles	Valley Springs
Contra Costa County			
American Radiator & Standard Sanitary Mfg. Co., H. W. Creeger, Mgr.	a	Box W, Richmond	Richmond
California Art Tile Corp.	a	Box 1116, Richmond	Richmond
Port Costa Brick Works, C. G. Berg, Pres.	b, c	6th and Berry Sts., San Francisco	Port Costa
Stockton Fire Brick Co.	b	Russ Bldg., San Francisco	Pittsburg
Technical Porcelain & China Ware Co.	a	Manila & Kearney Sts., El Cerrito	El Cerrito
United Materials & Richmond Brick Co., Ltd.	a, b	Box 7, Richmond	Richmond
Fresno County			
Craycroft Brick Co.	a, b, c	Griffith-McKenzie Bldg., Fresno	Fresno
Humboldt County			
D. J. Thompson Brick Co.	a, b, c	Box 16, Myrtle Ave., Eureka	Eureka
Inyo County			
W. R. Cantley	e	Olancha	Olancha
Coen Companies, Inc.	e	610 S. Broadway, Los Angeles	Death Valley

Kern County			
American Minerals Co.	c	5601 S. Boyle, Los Angeles	Cantil
Bakersfield Rock & Gravel Co.	d	Box 395, Sta. A, Bakersfield	Bakersfield
Bakersfield Sandstone Brick Co., James Curran, Mgr.	b	Bakersfield	Bakersfield
Filtrol Company	e	1755 Downey Rd., Los Angeles	Tehachapi
King Lumber Co.	b	1402 King St., Bakersfield	Bakersfield
Mojave Corp.	d	Box 174, Los Nietos	Frazier Park
Muroc Clay Co.	e	5525 Randolph St., Maywood	Muroc
Los Angeles County			
Alhambra Kilns, Inc., L. C. Merwin*	a	Alhambra	Alhambra and Santa Monica
American Container Co., Inc.	a	3132 E. Pico Blvd., Los Angeles	Los Angeles
Angulo Tile Co., L. R. H. and W. H. Angulo	a, c	Reseda, Los Angeles County	Reseda
B. W. Tile Co.	a	14600 S. Western Ave., Gardena	Gardena
J. A. Bauer Pottery Co.	a	415 W. Ave. 33, Los Angeles	Los Angeles
J. Booth	a, c	1775 Stanford, Santa Monica	Santa Monica
Builders Brick Co., Ltd.	b	177th and Western Aves., Moneta	Moneta and Compton
City Brick Co.**	b	1900 W. Manchester, Los Angeles	Los Angeles
Clayburn Brick & Tile Co., P. G. Lingren, Mgr.	b	1376 W. 25th St., Long Beach	Long Beach
Coast Brick Co.	b	Torrance	Torrance
H. F. Coors Co., Inc.	a	Inglewood	Inglewood
Davidson Brick Co.	b	4701 Floral Dr., Los Angeles	Los Angeles
Eljer California Co.	a	4100 Alameda, Los Angeles	Arcadia
Emsco Refractories Co.	a, b	5601 S. Boyle Ave., Vernon	Vernon
Gladding, McBean & Co., Tropico, L. A. & S. M. Plants	a, b, c	2901 Los Feliz Blvd., Los Angeles	Tropico, Los Angeles, Santa Monica, Hermosa Beach and Vernon
Higgins Brick & Tile Works	a, b, c	Box 525, Moneta	Moneta
Italian Terra Cotta Co.	a	1149 Mission Rd., Los Angeles	Los Angeles
Markoff Mosaic Tile Corp.	a	1107 E. Redondo Blvd., Inglewood	Inglewood
Meyers Pottery Co.	a	2318 E. 52d St., Los Angeles	Los Angeles
Pacific Clay Products	a, b, c	Box 145, Sta. A, Los Angeles	Los Angeles and Los Nietos
Pacific Tile & Porcelain Co.	a	3428 W. Pico Blvd., Los Angeles	Los Angeles and Los Nietos
Pomona Brick Co.	b	Pomona	Pomona
Pomona Tile Mfg. Co.	a	Pomona	Pomona
San Vallee Tile Kilns, R. F. Stubver, Mgr.	a, c	6601 Wilbur, Reseda	Reseda
St. Louis Fire Brick and Clay, Joseph Mesmer	b	3050 E. Slauson St., Los Angeles	Los Angeles
Simons Brick Co., Walter R. Simons	a, b, c	1195 S. Boyle Ave., Los Angeles	Los Angeles
Star Brick Co.	b	Moneta	Moneta
Tillotson Clay Products	a, b	3363 Fruitland Rd., Vernon	Vernon
Vernon Potteries	a	2300 E. 52d St., Los Angeles	Vernon
Vitrefrax Co.	a, b, c	5050 Pacific Blvd., Los Angeles	Los Angeles
Marin County			
McNear Brick Co.	a, c	McNear Point, San Rafael	McNear

a. Clay products. b. Brick and hollow building-tile. c. Crude clay. d. Oil-well drilling-mud. e. Filtering clay. f. Fire sand.
* Operations discontinued March, 1940.
** Plant dismantled and sold.

CLAY—1940—Continued

(Including producers of crude clay; and manufacturers of brick, tile, porcelain, etc.)

Operator	Remarks	Address	Location of plant or pit
Mono County			
California Kaolin Co.	c	2390 Ridgway Rd., San Marino	Casa Diablo
Orange County			
El Toro Clay Co., I. P. Arnold	c, f	1846 W. 83d St., Los Angeles	El Toro
Gladding, MacBean & Co.	c	2901 Los Feliz Blvd., Los Angeles	Gypsum
La Bolsa Tile Co.	a, c	R.F.D. 1, Box 174, Huntington Beach	Smeltzer
Mission Clay Products Co.	a, b, c	Olive	Olive
Tierra Colorado Clay Co.	c	Box 473, San Juan Capistrano	San Juan Capistrano
Placer County			
Clay Corp. of Calif.	c	1267 Russ Bldg., San Francisco	Lincoln
Gladding, McBean & Co.	a, b, c	2901 Los Feliz Blvd., Los Angeles	Lincoln
Lincoln Clay Products Co.	c	Lincoln	Lincoln
Riverside County			
Alberhill Coal & Clay Co.	c	Box 4267, Village St., Los Angeles	Alberhill
Los Angeles Brick Co.	a, b, c	1078 Mission Rd., Los Angeles	Alberhill
Pacific Clay Products	c	Box 145, Sta. A, Los Angeles	Corona
Temescal Clay Co.	c	5601 S. Boyle Ave., Los Angeles	Temescal
Sacramento County			
Cannon & Co.	a, b, c	Box 802, Sacramento	Ben Ali
H. C. Muddox, Jessie E. Muddox, Owner	a	30th and L Sts., Sacramento	Sacramento
Panama Pottery Co.	a	R.F.D. 4, Box 1478, 24th St. Rd., Sacramento	Sacramento
Sacramento Brick Co.	b	1300 Front St., Sacramento	Sacramento
San Bernardino County			
American Radiator & Standard Sanitary Corp.	c	Campo	Hart
Baroid Sales Div., National Lead Co.	d, e	830 Ducommun St., Los Angeles	Hector
Mr. Walter Becker	e	Box 43, Red Mountain	Red Mountain
Hancock Brick Yard, C. P. Hancock & Son	b	4330 Lemon St., Riverside	Highgrove
Kennedy Clay Pit, John Kennedy	c	5009 O'Sullivan Dr., Los Angeles	Daggett
Kennedy Minerals Co.	c	2550 E. Olympic Blvd., Los Angeles	Colton
Pacific Bentonite Mine, Louis Martinez	e	Box 374, Red Mountain	Red Mountain
C. Solomon, Jr.	c	2457 Scott St., San Francisco	Barstow
Southern California Minerals Co., W. K. Skeoch	c	320 S. Mission Rd., Los Angeles	Goff
J. H. Stone	e	Barstow	Barstow
Temescal Clay Co.	g	5601 S. Boyle Ave., Vernon	Hicks
Velvet-White Co., B. N. Murphy	c	406 E. Broadway, Glendale	Oro Grande

San Diego County			
Pacific Clay Products Co.	c	Box 145, Station A, Los Angeles	Farr Station
Union Brick Co., J. W. Rice	b	3565 3d St., North San Diego	Rose Canyon
Vitrified Products Corp.	a, b, c	4570 Pacific Highway, San Diego	North San Diego
San Francisco County			
Glow-Art Products Co., Ed Ayres	a	128 Perry St., San Francisco	San Francisco
San Joaquin County	a	McKinley Ave., Stockton	Stockton
San Joaquin Brick Co., J. F. Stein, Secretary	b	33 S. El Dorado St., Stockton	Stockton
Stockton Brick & Tile Co.	a, b, c	McKinley Ave., Stockton	Stockton
San Luis Obispo County			
Antelope Mud Co., W. G. Angus, Mgr.	d	Box 204, Lost Hills	Cholame
San Luis Brick Works, Faulstick Bros.	b	San Luis Obispo	San Luis Obispo
San Mateo County			
Richmond Potteries, Inc.	a	Box 187, South San Francisco	South San Francisco
Santa Barbara County			
McNall Building Materials	a, b, c	208 N. Salsipuedes, Santa Barbara	Santa Barbara
Santa Clara County			
Garden City Pottery	a	560 N. 6th St., San Jose	San Jose
Gladding Bros. Mfg. Co.	a, b, c	S. 3d and Keyes Sts., San Jose	San Jose
Handcraft Tile Co., L. W. Austin, et al.	a	R.F.D. 2, Box 121A, San Jose	San Jose
Myers Ceramic Pottery, A. Clay Myer	a	Box 97, Santa Clara	Santa Clara
Remillard-Dandini Co.	b	569 3d St., Oakland	San Jose
S. & L. Tile Co.	a	1881 S. 1st St., San Jose	San Jose
Sonoma County			
Clay Corp. of Calif.	c	1267 Russ Bldg., San Francisco	Glen Ellen
Stanislaus County			
Coopertown Clay Deposit, J. H. Hornsby	c	651 Cumberland St., Pittsburg	Coopertown
Sutter County			
Gladding, McBean & Co.	c	2901 Los Feliz Blvd., Los Angeles	Nicolaus
Tulare County			
San Joaquin Materials Co.	b	744 G St., Fresno	Exeter
Ventura County			
Shell Oil Co., Dent Clay Pit	d	Shell Bldg., San Francisco	Ventura

a. Clay products. b. Brick and hollow building-tile. c. Crude clay. d. Oil-well drilling-mud. e. Filtering clay. f. Fire sand.

COAL

Operator	Address	Location of mine
Contra Costa County		
J. C. McFabyen	Concord	Concord
Fresno County		
San Joaquin Valley Coal Mine, M. J. Raney	Route 3, Box 139C, Bakersfield	Coalinga

COPPER

Principal Copper Producers in California during 1940

Mine	Operator	Address	Location of mine
Inyo County			
Columbia No. 2	Shoshone Mines, Inc.	Tecopa	Tecopa
Pine Creek (by-product of tungsten ore)	U. S. Vanadium Corp.	30 E. 42d St., New York, N. Y.	Bishop
Mono County			
	William T. Holser	Benton	Benton
Nevada County			
Lava Cap	Lava Cap Gold Mining Corp.	Box 780, Nevada City	Nevada City
Plumas County			
Walker	Walker Mining Co.	821 Kearns Bldg., Salt Lake City, Utah	Walkermine
Riverside County			
Black Eagle	Imperial Smelting & Ref. Co.	811 W. 7th St., Los Angeles	Indio
San Bernardino County			
Bagdad-Chase	Frank W. Royer	Red Mountain	Ludlow
Shasta County			
Iron Mountain	The Mountain Copper Co., Ltd.	351 California St., San Francisco	Matheson

DIATOMITE (DIATOMACEOUS EARTH)

Operator	Address	Location of quarry or mine
Contra Costa County		
California Spray Chem. Corp.	Lucas and Ortho Way, Richmond	Pinole
Los Angeles County		
The Dicalite Co.	756 S. Broadway, Los Angeles	San Pedro
Monterey County		
Pacatome, Ltd.	Bradley	Bradley
Santa Barbara County		
Johns-Mansville Products Corp.	Lompoc	Lompoc

DOLOMITE

Operator	Address	Location of quarry
Inyo County		
Inyo Marble Co.	726-732 E. 29th St., Los Angeles	Keeler
Los Angeles County		
W. F. Glasser, Inc.	713. N. Sepulveda, Brentwood Heights, Los Angeles	Bel-Air
Monterey County		
Bethlehem Steel Co.,§ Sterling Ranch Quarry	20th and Illinois, San Francisco	Natividad
San Benito County		
Archie E. Hamilton	Hollister	Hollister
U. S. Lime Products Corp.*	85 2d St., San Francisco	Sonora

§ Temporarily idle in 1940.
* Output used in lime.

FELDSPAR

Operator	Address	Location of mine
Fresno County		
W. H. Childers	Box 671, Fresno	Friant
San Bernardino County		
Gladding, McBean & Co.	2901 Los Feliz Blvd., Los Angeles	
San Diego County		
American Radiator & Standard Sanitary Corp., D. D. Fleming, Mgr.	Campo	Campo

GEMS AND JEWELERS' MATERIALS

Operator	Variety	Address
W. C. Eyles	Petrified wood, onyx, chalcedony	794 W. A St., Hayward
Robert J. Graham	Iridescent obsidian	Davis Creek
H. F. Heather	Iceland-spar	236 Oak Knoll Ave., Pasadena
Pala Chief Mine, Margaret S. Moore & M. Wear	Tourmaline, Kunzite, quartz crystals	Box 33, Pala
J. W. Ware	Tourmaline	1050 6th St., San Diego

Principal gold producers in California out of a total of 1,866 placer operators and lode mines in 1940

Mine	Type of mine	Operator	Address	Postoffice of mine
Alpine County				
Zaca	a	Steve Rastelli and Steve Maffi	826 Humboldt, Reno, Nev.	Markleeville
Amador County				
Arata-Van Sandt property	e	Gold Hill Dredging Co.	311 California St., San Francisco	Camanche
Argonaut	a	Argonaut Mining Co., Ltd.	Jackson	Jackson
Arroyo Seco	h	Arroyo Seco Gold Dredging Co.	351 California St., San Francisco	Ione
Arroyo Seco Ranch	h	San Andreas Gold Dredging Co.	960 Russ Bldg., San Francisco	San Andreas
Belden	a	Belama Corp.	Pine Grove	Pine Grove
Buena Vista	e	Lancha Plana Gold Dredging Co.	Camanche	Camanche
Central Eureka and Old Eureka	a	Central Eureka Mining Co.	Sutter Creek	Sutter Creek
Delta Tailings	e	Delta Tailings Co.	564 Market St., San Francisco	Ione
Garibaldi	k	Garibaldi Bros.	Volcano	Volcano
Horseshoe Dredge	h	Horseshoe Dredging Co.	Ione	Ione
Horton	g	H. G. Kroth	Route 1, Box 67, Ione	Ione
Italian	a	Black Hills Mining Co.	Jamestown	Drytown
Kennedy	a	Kennedy Mining & Mlng Co.	519 California St., San Francisco	Martell
Kent Dredge	h	E. A. Kent	351 California St., San Francisco	Sutter Creek
Keystone	a	Keystone Mine Syndicate	Amador City	Amador City
Ernest L. Lilly Dredge*	h	Ernest L. Lilly	706 California Bldg., Stockton	Ione
John McCulloh Property	k	Pacific Placers Engineering Co.	Valley Springs	Valley Springs
Pioneer	a	Gwalia Gold Mining Co.	Pine Grove	Pine Grove
Placeritas Dredge*	h	Placeritas Mining Co.	245 N. Gramercy Pl., Los Angeles	Plymouth
Plymouth Tails	e	Argonaut Mining Co., Ltd.	Jackson	Plymouth
Rim Can Dredge*	h	Rim-cam Gold Dredging Co.	Ione	Ione
River Pine	h	River Pine Mining Co.	2432-19th Ave., San Francisco	Plymouth
Rupley Ranch	k	John C. Pantle	Plymouth	Plymouth
Butte County				
Butte Operating Co. property	h	Butte Operating Co.	Oroville	Oroville
Butte Unit Yuba Cons. Dredge	e	Yuba Cons. Gold Fields	351 California St., San Francisco	Hammonton
Farnan Ranch	h	Baker & McCowan	Palermo	Palermo
Feather River Dredge	h	Golden Feather Dredging Co.	817-25th St., Sacramento	Oroville
Gianella Ranch	h	Interstate Mines, Inc.	Box 498, Chico	Palermo
L. L. Kister property	h	Humphreys Gold Corp.	910 First National Bank Bldg., Denver, Colo.	Sloughhouse
Lemroh	h	Lemroh Mining Co.	2401 Bayshore Blvd., San Francisco	
Little Butte	a	Dr. D. W. Babcock	Empire Bldg., Placerville	Magalia
Peters Ranch	h	Lord & Bishop	Box 812, Sacramento	Oroville
Piombo Bros. Dredge	h	Piombo Bros. & Co.	1571 Turk St., San Francisco	Oroville
Placer Development Co. property	h	Placer Development Co.	2401 Bayshore Blvd., San Francisco	Oroville

* Dredging operators on two or more properties combined.

a. Lode gold mine. b. Gold-Silver mine. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline operations. j. Copper-Gold mine. k. Power shovel or dry land dredge. m. Lead mine.

Principal gold producers in California out of a total of 1,866 placer operators and lode mines in 1940

Mine	Type of mine	Operator	Address	Postoffice of mine
Butte County—Continued				
William Richter & Sons Dredge*	h	William Richter & Sons	Oroville	Oroville
Surcease	a	Hoefling Bros.	Box 786, Sacramento	Oroville
Weymans Ravine	h	Sunmar Dredging Co.	Box 228, Oroville	Oroville
Wilton Kister property	e	Gold Hill Dredging Co.	311 California St., San Francisco	Oroville
Calaveras County				
Big Springs	a	C. E. Gruwell	Angels Camp	Angels Camp
Carson Hill	a	Carson Hill Gold Mining Corp.	Melones	Melones
Cat Camp	g	J. E. Biallas	Valley Springs	Valley Springs
Comet	a	Comet Quartz Mine, Inc., and lessees	San Andreas	San Andreas
Cooks	k	Midas Placer Co.	Camanche	Camanche
Easy Bird	a	Le Roi Mines, Inc.	Jackson	Jackson
Genochio	h	James H. Henry	740 W. Willow St., Stockton	San Andreas
Glo-Bar	f	Glo-Bar Mines	370 E. 37th St., Long Beach	San Andreas
C. F. Hogate Ranch	h	C. E. Gruwell	Angeles Camp	Angels Camp
Lancha Plana Dredge No. 2	e	Lancha Plana Gold Dredging Co.	Camanche	Camanche
Mehrten Bros. Dredge	k	L. C. and Charles Mehrten, Jr.	Box 143, Camanche	Camanche
Mountain King	a	Jumbo Cons. Mining Co.	425 Title Ins. Bldg., Los Angeles	Copperopolis
Pine Log	a	Will Halloran	Milton	Milton
R and M Dredge	h	R and M Mining Co.	La Porte	Douglas Flat
Red Hill	k	Young & Son Co., Ltd.	Mokelumne Hill	Mokelumne Hill
Royal	a	Frank S. Tower	Milton	Milton
Ryno property	k	Pacific Placers Engineering Co.	Valley Springs	Valley Springs
San Andreas Dredge*	h	San Andreas Gold Dredging Co.	960 Russ Bldg., San Francisco	San Andreas
Sheep Ranch	a	St. Joseph Lead Co.	Sheepranch	Sheepranch
Stagan Dredge	h	Stagan Mining Co.	1440 N. Hunter St., Stockton	Jenny Lind
Stockton Gregory property	h	W. C. Thompson	Box 77, Linden	Linden
Stockton Reservoir	h	Lord & Bishop	Box 812, Sacramento	Stockton
Vallecito Western	f	Vallecito Mining Corp.	Murphys	Angels Camp
Wolhall	h	Wolhall Dredging Corp.	Natoma	San Andreas
El Dorado County				
Alhambra-Shumway	a	Alhambra-Shumway Mines, Inc.	Kelsey	Kelsey
Arroyo Mining Co. Lease	h	Greenhorn Dredging Co.	Youngs	Youngs
Briarcliffe	a	Briarcliffe Mines, Ltd.	Box 166, Plymouth	Plymouth
Carson Creek	h	McQueen & Downing	Weaverville	Kelsey
Cosumnes	a	Cosumnes Mines, Inc.	Grizzly Flat	Grizzly Flat
D. G. Davenport property	k	Irish Creek Mining Co.	Georgetown	Georgetown
Dunlap Ranch	h	Big Canyon Dredging Co.	Box 656, Fresno	Folsom
El Dorado Crystal	a	El Dorado Crystal Mine	Shingle Springs	Shingle Springs
El Dorado Dredge*	h	El Dorado Dredging Corp.	Greenwood	Greenwood
Greenwood	a	John Van Daam	156 Montgomery St., San Francisco	Greenwood
Frank Kipp property	h	Horseshoe Dredging Co.	Youngs	Youngs

Lemroh Dredge	h	Lemroh Mining Co.	2401 Bayshore Blvd., San Francisco	
Morgan	k	Irish Creek Mining Co.	Georgetown	Georgetown
Operation No. 2	h	General Dredging Corp.	Natoma	Lotus
Sliger	a	Middle Fork Gold Mining Co.	Auburn	Auburn
Fresno County				
Friant Dam aggregate deposit	k	Griffith Co. & Bent Co.	Friant Dam	Friant
Humboldt County				
Pearch	g	Fred Delaney and Roy McGain	Orleans	Orleans
Imperial County				
Cargo Muchacho group	a	Holmes & Nicholson Mining & Mlng Co.	Box 828, Yuma, Ariz.	Ogilby
Mary Lode	a	Mary Lode Mines	Drawer 442, El Centro	Glamis
Queen	a	Thomas L. Woodruff	Ogilby	Ogilby
Sovereign	a	Sovereign Development Co.	Ogilby	Ogilby
Inyo County				
Big Bell	a	K. M. Woods	Box 124, Beatty, Nev.	Beatty, Nev.
Columbia No. 2	m	Shoshone Mines, Inc.	Tecopa	Tecopa
Del Norte-Skidoo	a	Del Norte Mining Co. and lessees	Mojave	Trona
Margaret	a	Don H. Clair	Box 51, Trona	Trona
Reward (Brown Monster)	a	Basil Prescott et al.	Lone Pine	Independence
Ruth	a	Burton Bros.	Rosamond	Trona
Kern County				
Big Blue and Lady Belle	a	Kern Mines, Inc.	Kernville	Kernville
Black Hawk	a	Ernest Stevens et al.	Randsburg	Randsburg
Bobtail	a	W. L. Dietz	Mojave	Mojave
Butte Lode	a	Butte Lode Mining Co.	650 S. Grand Ave., Los Angeles	Randsburg
Cactus Queen	b	Cactus Mines Co.	Rosamond	Rosamond
Desert Queen	a	Morris Albertoli	Box 2028, Mojave	Mojave
Four Jacks	a	Eric Fallen et al.	Mojave	Mojave
G. B. and Boston No. 2 Claims	a	Wegman, Movold and Wegman	Box 43, Red Mountain	Red Mountain
Gold Bug	a	Tony De Mayo et al.	Randsburg	Randsburg
Golden Queen	a	Golden Queen Mining Co.	Mojave	Mojave
Lodestar	a	Lodestar Mining Co.	Mojave	Mojave
King Solomon	a	King Solomon Mines Lease	Johannesburg	Randsburg
Lone Star	a	Mattie Moreland	Bodfish	Bodfish
Lucky Boy	a	T. B. Peterson	Box 186, Randsburg	Randsburg
Standard	a	B. F. Forbes and lessees	Mojave	Mojave
Tropico	a	Burton Bros. and lessees	Mojave	Mojave
Wade	a	Glen Hatton et al.	Box 345, Red Mountain	Red Mountain
White	a	F. E. Edwards et al.	Red Mountain	Red Mountain
Yellow Aster	c	Anglo American Mining Corp., Ltd.	Randsburg	Randsburg
Yellow Dog	a	Jack Holt et al.	Mojave	Mojave
Yellow Rover	a	A. J. Bruce et al.	Mojave	Mojave

* Dredging operations on two or more properties combined.

a. Lode gold mine. b. Gold-Silver mine. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline operations. j. Copper-Gold mine. k. Power shovel or dry land dredge. m. Lead mine.

GOLD—Continued

Principal gold producers in California out of a total of 1,866 placer operators and lode mines in 1940

Mine	Type of mine	Operator	Address	Postoffice of mine
Los Angeles County				
Governor	a	Governor Mine Co.	725 S. Figueroa St., Los Angeles	Acton
Mariposa County				
Baker Dredge	h	Barker Corp.	Hornitos	Hornitos
Bondurant	a	Bondurant Mining & Mlng. Co.	405 Montgomery St., San Francisco	Coulterville
Chase Ranch	h	Trebor Corp.	Box 51, Mariposa	Mariposa
Ferguson	a	San Juan Ramsey Co.	Box 30, Incline	Incline
Granite King	a	Buckeye Mining Co.	Mariposa	Mariposa
Hauser	a	W. H. Hauser	3028 E. 17th St., Oakland	
Malvina	a	Boston Calif. Mining Co.	Sonora	Coulterville
Mount Gains	a	Mount Gains Mining Co.	Hornitos	Hornitos
Nutmeg	a	John F. Zak	4317 T St., Sacramento	Mariposa
Pine Tree and Josephine	a	Pacific Mining Co.	1022 Crocker Bldg., San Francisco	Bear Valley
Pittsburg	a	L. E. Walbridge	Mt. Bullion	Mt. Bullion
Schroeder	a	Schroeder, Odgers and Schroeder	Midpines	Midpines
Merced County				
P. H. Bottoms Dredge	h	P. H. Bottoms	Box 121, Merced Falls	Snelling
Merced Dredge No. 1	e	Merced Dredging Co.	Mills Tower, San Francisco	La Grange
Merced Unit	e	Yuba Cons. Gold Fields	351 California St., San Francisco	Snelling
Robinson Bros. property	h	Gibson Mining Co.	Route 2, Box 17, Oroville	Snelling
San Joaquin Dredge No. 1	e	San Joaquin Mining Co.	1805 Mills Tower, San Francisco	La Grange
Snelling Dredges Nos. 1 and 2	e	Snelling Gold Dredging Co.	Snelling	Snelling
Mono County				
Gold Crown	a	Robert G. Jones	Benton	Benton
Log Cabin	a	Log Cabin Mines Co.	Leevining	Leevining
Monte Christo	a	Monte Christo Mining Co.	Box 134, Whittier	Mammoth Lakes
Standard	a	Roseklip Mines Co.	206 Sansome St., San Francisco	Bodie
Napa County				
Grigsby (Palisades)	b	Graham Loftus Oil Corp.	811 W. 7th St., Los Angeles	Calistoga
Nevada County				
Arctic	a	Kemmerer Exploration Co.	Eureka, Utah	Washington
Bullion	a	Grass Valley Bullion Mines	Russ Bldg., San Francisco	Grass Valley
Champion Flat	h	Dakins Co.	917 Sacramento St., San Francisco	Nevada City
Coleburn property	h	Pilot Dredging Co.	Cottonwood	Nevada City
Empire Star Group	a	Empire Star Mines Co., Ltd.	14 Wall St., New York, N. Y.	Grass Valley
Golden Center	a	Cooley Butler	745 Rowan Bldg., Los Angeles	Grass Valley
Green Mountain	a	James Kistle	Nevada City	Nevada City
Idaho Maryland	a	Idaho Maryland Mines Corp.	Box 1028, Grass Valley	Grass Valley
Lava Cap	a	Lava Cap Gold Mining Corp.	Box 780, Nevada City	Nevada City

North Star Tails	c	Charles Lintecum	223 N. Auburn St., Grass Valley	Grass Valley
Parker Ranch	k	Kanfield & McKinley	Lincoln	North Bloomfield
Scotts Flat Creek property	h	William Richter	Oroville	Scotts Flat
Spanish	a	Bradley Mining Co.	425 Crocker Bldg., San Francisco	Washington
Trood	k	William Von Der Hellen	Box 158, Yreka	Nevada City
Wyandotte Dredge*	h	Wyandotte Dredging Co.	Box 228, Nevada City	Nevada City
Placer County				
Ahart Ranch	k	Pantle Bros.	Lincoln	Lincoln
Alabama	a	Alabama Gold Mines Co.	Auburn	Auburn
Harold A. Best Dredge*	k	Harold A. Best	Lincoln	Lincoln
Duncan Hill	a	Duncan Hill Cons.	Auburn	Auburn
Eclipse	a	Ophir Nevada Mining & Mlng. Co.	Auburn	Auburn
El Oro Dredge*	h	El Oro Dredging Co.	Colfax	Colfax
Gaylord-Laville	f	J. A. Conners	Box 788, Auburn	Auburn
Gladding Ranch	h	Aalders and Prather	Lincoln	Lincoln
Guilford Ranch	h	Fay Placer Mines Co.	Lincoln	Lincoln
Hallstrom and Lindblad Dredge*	k	Hallstrom and Lindblad	Route 7, Box 4343A, Sacramento	Loomis
Highway Forty	a	Highway Forty Mines, Inc.	1235 42d St., Sacramento	Auburn
Innis Dredge	h	Innis Dredging Co.	Nevada City	Nevada City
Lost Camp	g	Lost Camp Mining Co.	Blue Canon	Blue Canon
Love Ranch	k	Kaufield and McKinley	Box 274, Lincoln	Loomis
Midland Dredge	h	Midland Company	Box 8, Sawyers Bar	Lincoln
Minnie Thavenet Ranch	k	Sills Bros.	Auburn	Auburn
Oro Fino	a	Oro Fino Cons. Mines	Box 432, Auburn	Auburn
Panob Dredge*	k	Panob Gold Dredging Co.	Box 896, Lincoln	Lincoln
Rawhide	a	Canyon Mines Corp.	Baxter	Baxter
Recalp	h	Jasper-Stacy Co.	Lincoln	Lincoln
Rizzi	k	Charles M. Chittenden	Lincoln	Lincoln
Ruck-a-Chucky Dam Site	a	O. D. Johnson et al.	Auburn	Auburn
Scouler	k	W. K. Potts	Auburn	Auburn
Strap Ravine	e	Roseville Gold Dredging Co.	351 California St., San Francisco	Roseville
Volcano	f	Volcano Mining Co., Ltd.	1018 Mills Bldg., San Francisco	Foresthill
Yamada	k	R. O. Bohnett	Box 454, Loomis	Loomis
Plumas County				
Cherokee	a	Cherokee Mine	200 Bush St., San Francisco	Greenville
Imperial	a	Gerald R. Simpson	Box 957, Quincy	Quincy
Innis Dredge	h	Innis Dredging Co.	Nevada City	Greenville
Jamison	a	Sierra Manzanita Mining Co. et al.	Blairsden	Blairsden
Meadow Valley	h	Baker and McCowan	Box 305, Chico	Meadow Valley
Ohio Point	a	Virgilia Mining Corp.	Virgilia	Virgilia
Standart	a	Indian Valley Mining Co., Inc.	Greenville	Johnsville
Walker	j	Walker Mining Co.	821 Kearns Bldg., Salt Lake City, Utah	Walkermine
Riverside County				
Black Eagle	m	Imperial Smelting & Ref. Co.	Box 1096, Indio	Indio
Standard	a	Joe Geiger and Willard H. Allen	Twenty-nine Palms	Twenty-nine Palms
Water Well	a	Mission Mining Corp., Ltd.	Box 611, Mecca	Mecca

* Dredging operations on two or more properties combined.

a. Lode gold mine. b. Gold-Silver mine. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline operations. j. Copper-Gold mine. k. Power shovel or dry land dredge. m. Lead mine.

GOLD—Continued

Principal gold producers in California out of a total of 1,866 placer operators and lode mines in 1940

Mine	Type of mine	Operator	Address	Postoffice of mine
Sacramento County				
Capital Dredge	e	Capital Dredging Co.	351 California St., San Francisco	Folsom
Cosumnes Dredge	e	Cosumnes Gold Dredging Co.	351 California St., San Francisco	Sloughhouse
Fassett-Parker Hanlon	h	Humphreys Gold Corp.	910 First National Bank Bldg., Denver, Colo.	Sloughhouse
General Dredge No. 1	h	General Dredging Corp.	505 Bank of America Bldg., Sacramento	Natoma
Hoosier Gulch Dredge*	h & k	Hoosier Gulch Placers	817 25th St., Sacramento	Sacramento
Hoxsie	k	H. W. McKinley	Star Route, Box 13, Folsom	Folsom
Lancha Plana Dredge No. 4	e	Lancha Plana Gold Dredging Co.	Camanche	Cosumnes
Martin Quinn Estate	h	Carson Creek Dredging Co.	216 Pine St., San Francisco	Folsom
McQueen and Downing Dredge	h	McQueen and Downing	Weaverville	Folsom
Natomas	e	Natomas Company	Box 1197, Sacramento	Natoma
Prairie City	k	Kutil Gold Dredge	Box 191, Folsom	Folsom
John Vincent Property	h	Climax Dredging Co.	Box 21, Roseville	Roseville
San Bernardino County				
Bagdad-Chase	a	Frank W. Royer	Red Mountain	Ludlow
Carlyle	a	Camco Mining Co.	Twenty-nine Palms	Twenty-nine Palms
Gold Crown	a	Gold Crown Mining Co.	Twenty-nine Palms	Twenty-nine Palms
Gold Stone	a	Leroy A. Wilson	2506 W. 15th St., Los Angeles	Twenty-nine Palms
Holcomb Valley Placer	k	Holcomb Valley Placer Co.	973 N. Main St., Los Angeles	Big Bear Lake
Kelly	a	Frank W. Royer et al.	Red Mountain	Red Mountain
Santa Fe (Arlington)	a	Santa Fe Gold Mines, Inc. and Mines, Inc.	Lucerne Valley	Victorville
Telegraph	a	C. F. Robbins et al.	Barstow	Baker
Valley View	a	W. W. Hartman	1230 E. 109th St., Los Angeles	Ivanpah
----------	a	H. J. Jackson	Box 93, Ludlow	Ludlow
San Joaquin County				
California Gold Dredge	e	California Gold Dredging Co.	351 California St., San Francisco	Camanche
Jennie Lucas and E. A. Putnam property	e	Gold Hill Dredging Co.	311 California St., San Francisco	Clements
McGurk property	h	C. E. Gruwell and San Gruco Co.	Angels Camp	Belota
Watkins Dredge	h	A. G. Watkins and Sons	Linden	Linden
Shasta County				
Blue Gravel	a	August Carino	Box 571, Redding	Redding
Champion Gulch	h	J. P. Brennan	1343 Butte St., Redding	Redding
China Gulch	h	Roy S. Olson	Redding	Redding
Clear Creek Dredge	h	Clear Creek Dredging Co.	Redding	Redding
Crow Creek Dredge	h	Crow Creek Dredging Co.	Box 558, Redding	Redding
Daly Gulch	h	R. S. Olson	Redding	Redding
French Gulch Placer	e	French Gulch Dredging Co.	2404 Russ Bldg., San Francisco	French Gulch
Greenhorn	a	Willow Creek Mines, Inc.	Redding	French Gulch
Happy Valley	h	San Gruco Co.	217 Bank of America Bldg., Beverly Hills	Igo
Iron Mountain	a	The Mountain Copper Co., Ltd.	351 California St., San Francisco	Matteson

Kutras Tract	k	Columbia Construction Co., Inc.	Redding	Redding
Lost Channel	h	J. P. Brennan	1343 Butte St., Redding	Redding
Montezuma	a	Niagara Summit Mining Co.	1607 Market St., San Francisco	French Gulch
Philadelphia and Roosevelt	a	A. P. Robillard	465 California St., San Francisco	French Gulch
Pioneer Dredge	h	Pioneer Dredging Co.	Box 305, Redding	Redding
Thurman Dredge	e	Thurman Gold Dredging Co.	Redding	Redding
Walker	a	Walker Mine Cons.	Box 983, Redding	Redding
Washington	a	J. H. Scott Co.	465 California St., San Francisco	French Gulch
Sierra County				
Bowman	a	W. C. Ennis and Carl L. Johnson	North San Juan	Alleghany
Colombo	a	R. D. Compton	Calpine	Sierra City
Depot Hill	g	F. J. Joubert	Camptonville	Camptonville
Loftus Blue Lead	g	Loftus Blue Lead Mines Co.	801 Columbia St., South Pasadena	La Porte
Oriental	a	Dickey Exploration Co.	Alleghany	Alleghany
Original Sixteen to One	a	Original Sixteen to One Mine, Inc.	1611 Russ Bldg., San Francisco	Alleghany
Plumbago	a	Allied Mines, Inc.	Alleghany	Alleghany
Poverty Hill	g	A. J. Oyster	650 Russ Bldg., San Francisco	La Porte
Siskiyou County				
Buzzard Hill	a	Merriam Mining Merger	Box 68, Happy Camp	Happy Camp
Cal Oro	e	Cal Oro Dredging Co.	681 Market St., San Francisco	Yreka
Etna Gold Dredge	e	Etna Gold Dredging Co.	1730 Franklin St., Oakland	Callahan
Happy Camp Dredge	h	Happy Camp Dredging Co.	Happy Camp	Happy Camp
Hayden	k	Okoro Mines, Inc.	Callahan	Callahan
Humbug Creek	h	Von der Hillen and Webber	Box 217, Yreka	Yreka
Joubert	g	H. J. Dickinson	Sawyers Bar	Sawyers Bar
Judge	g	E. Oberg	Sawyers Bar	Sawyers Bar
Kangaroo	h	Oro Trinity Gold Dredging Co.	Box 212, Oroville	Callahan
King Solomon	a	King Solomon Mines Co.	Monte Vista, Colo.	Black Bear
Klamath River	h	William Van der Hellen Mining Co.	Box 158, Yreka	Yreka
Know Nothing No. 1	g	Clarence Young & Co.	Forks of Salmon	Forks of Salmon
Larsen & Harms Dredge*	h	Larsen and Harms	Route 4, Box 2220, Sacramento	Horse Creek
Oro Grande (McKeen)	a	Oils Incorporated of Calif.	405 Montgomery St., San Francisco	Callahan
Sacchi-Spellenberg	h	Sacchi-Spellenberg Mines	Arcata	Forks of Salmon
Siskiyou Unit	e	Yuba Cons. Gold Fields	351 California St., San Francisco	Callahan
Quartz Hill	a	George Noonan	Scott Bar	Scott Bar
Schroeder	a	Schroeder Mining & Development Co.	110 S. Broadway, Yreka	Yreka
Yreka Dredge	e	Yreka Gold Dredging Co.	351 California St., San Francisco	Yreka
Stanislaus County				
C and E Dredge	h	C and E Dredging Co.	1002 Pacific Bldg., Portland, Ore.	Oakdale
Calif. Gold Dredge	e	Calif. Gold Dredging Co.	351 California St., San Francisco	Linden
La Grange Dredge No. 4	e	La Grange Gold Dredging Co.	1805 Mills Bldg., San Francisco	La Grange
Placer Properties	h	Placer Properties, Inc.	Box 532, Oakdale	Oakdale
Triboli & Sophy property	h	G & S Dredging Co.	Chowchilla	Chowchilla
Tuolumne Gold Dredge	e	Tuolumne Gold Dredging Corp.	1 Montgomery St., San Francisco	La Grange

* Dredging operations on two or more properties combined.

a. Lode gold mine. b. Gold-Silver mine. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline operations. j. Copper-Gold mine. k. Power shovel or dry land dredge. m. Lead mine.

Principal gold producers in California out of a total of 1,866 placer operators and lode mines in 1940

Mine	Type of mine	Operator	Address	Postoffice of mine
Trinity County				
Arbuckle	g	Arbuckle Bros.	Weaverville	Weaverville
B. H. K.	h	B. H. K. Mines	Orland	Weaverville
Canyon Placers	g	C. H. Bergin	Junction City	Junction City
Carrville Dredge	e	Carrville Gold Co.	807 Lonsdale Bldg., Duluth, Minn.	Trinity Center
Dawn	g	Dawn Mining Co.	Weaverville	Weaverville
Filibuster group	h	Viking Dredging Co.	Box 498, Chico	Douglas City
Hayfork Unit	h	Cinco Mineros Co.	Box 212, Oroville	Hayfork
Junction City	e	Junction City Mining Co.	685 6th St., San Francisco	Junction City
La Grange	g	La Grange Placer Mines, Ltd.	Weaverville	Weaverville
Lincoln Gold Dredge*	h	Lincoln Gold Dredging Co.	Lincoln	Lewiston
Lowden Ranch	h	Interstate Mines, Inc.	Box 14, Weaverville	Weaverville
Red Hill	h & g	Goldfield Cons. Mines Co.	1225 Crocker Bldg., San Francisco	Junction City
Slate Bar	g	Cal-Tex Mining Co.	Weaverville	Douglas City
Swanson	g	Swanson Mining Corp.	Salyer	Salyer
Trinity Dredge	e	C. R. and T. D. Harris	Lewiston	Lewiston
Weaver Dredge*	h	Weaver Dredging Co.	Box 216, Weaverville	Weaverville
Weaverville Unit	h	Oro Trinity Dredging Co.	Box 212, Oroville	Weaverville
Tuolumne County				
Chinese Camp Unit	h	Barker Corp.	Hornitos	Chinese Camp
Densmore	a	Densmore Gold Mines, Inc.	Columbia	Columbia
Eagle-Shawmut	a	Miller and Clemson	4800 Santa Fe Ave., Los Angeles	Chinese Camp
Heslep-App-Sweeney	a	Allied Mines, Inc.	Jamestown	Jamestown
Hidden Treasure	a	Harry Gibson et al.	Columbia	Columbia
Jackass (Dredge No. 2)	h	L. R. Harris	Merced	
Jumper	a	Lobicasa Company	Box 812, Sacramento	Jamestown
Kent Dredges No. 1 and No. 2	h	E. A. Kent	Box 391, Stockton	Jamestown
La Bienvenita	k	E. Z. Bowman	Box 6, Chinese Camp	Chinese Camp
La Guria	a	La Guria Gold Mining Co.	515 Fidelity Bldg., Los Angeles	Groveland
McCormick Ranch	h	Mullin and Company	Sonora	Sonora
Razzano and Lawrence Dredge	k	George Razzano	Chinese Camp	Chinese Camp
Ryan	a	Ryan Mining Co.	Twain Harte	Sonora
Sleepy Hollow	d	R. H. Hallock	Sonora	Sonora
Stockton	d	J. A. McMahon	2001 California St., San Francisco	Sonora
Yuba County				
Archimedes property	e	Williams Bar Dredging Co.	Box 575, Marysville	Smartville
Big Ravine	h	Parks Bar Co.	Box 932, Nevada City	Smartville
Far West Dredge	h	Far West Dredging Co.	Wheatland	Wheatland
Parks Bar	k	Arundel Corp.	Box 951, Marysville	Smartville
Pennsylvania	a	Empire Star Mines Co., Ltd.	14 Wall St., New York, N. Y.	Brown Valley
Princess Pine	h	R & M Mining Co.	La Porte	Strawberry Valley
Sunmar Dredge*	h	Sunmar Dredging Co.	Box 228, Oroville	Smartville
Yuba Unit	e	Yuba Cons. Gold Fields	351 California St., San Francisco	Hammonton

* Dredging operations on two or more properties combined.

a. Lode gold mine. b. Gold-silver mine. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline operations. j. Copper-Gold mine. k. Power shovel or dry land dredge. m. Lead mine.

Operator	Product	Address	Location of quarry
Fresno County			
Superior-Academy Granite Co.	a	Clovis	Academy
Lassen County			
Greig Quarry-A. D. Greig	a	Susanville	Susanville
Los Angeles County			
Binder Bros., W. H. Binder	d	285 N. Lake Ave., Pasadena	Bouquet Canyon
Madera County			
Madera Quarries Co.	a	Box 156, Madera	Bates Station
Nevada County			
Netz Granite Quarry, Ludwig Netz	a	Nevada City	Nevada City
Placer County			
Union Granite Co.-Ruhkala Bros.	a	Rocklin	Rocklin
Victor Wickman	a	Rocklin	Rocklin
Riverside County			
Emil Johnson	a	Perris	Perris
Ormand Quarry-Kumpe-Hauser Corp., Ltd.	e	Box 827, Riverside	Bly Junction
Sacramento County			
Folsom State Prison	a, e	Represa	Represa
San Bernardino County			
Texas Quarries, Inc., R. M. Richter	a	Box 91, Austin, Texas	Victorville
San Diego County			
American Marble & Granite Works	a	1212 E. Olympic Blvd., Los Angeles	Santee
Crystal Black Quarry, John Stridsburg	a	Escondido	Spooks Canyon
Pacific Cut Stone & Granite Co.	a	414 S. Marengo Ave., Alhambra	Escondido
Sonoma County			
S. Cabrol	b, e	Glen Ellen	Glen Ellen
Ernest Laurent	b, e	Kenwood	Kenwood
Ventura County			
Ritchie Bros., R. A. Ritchie and J. A. Ritchie	b	Fillmore	Grimes Canyon

a. Granite used in building and monumental stone. b. Tuff used as building stone. c. Volcanic rock used as flagstone and building stone. d. Mica schist used as building stone. e. Paving blocks.

GYPSUM

Operator	Address	Location of quarry
Alameda County		
Westvaco Chlorine Prod. Corp.*	Newark	Newark
Fresno County		
Dos Palos Gypsum Co., O. L. Divens and A. A. Conrowe	Dos Palos	Dos Palos
Imperial County		
Imperial Gypsum Quarry, Pacific Portland Cement	417 Montgomery St., San Francisco	Plaster City
Kern County		
H. M. Holloway	Box 310, Lost Hills	Lost Hills
Jim's Gypsum Pit, De Bartho & Bohns	Box 203, Lost Hills	Lost Hills
Monolith Portland Cement Co.	Bartlett Bldg., Los Angeles	Cuyana Valley
Valley Agricultural Gypsum	Box 186, Shafter	Lost Hills
Monterey County		
Triangle Fertilizer Co.	Salinas	King City
Riverside County		
U. S. Gypsum Co.	507 Architects Bldg., Los Angeles	Midland

* Output not included in production figures as gypsum is by product of chemical process using minerals already included in State total.

IODINE

Operator	Address	Mine
Los Angeles County		
Deepwater Chemical Co., Ltd.	Box 588, Compton	Compton
The Dow Chemical Co.	Midland, Mich.	Long Beach and Venice

IRON

Operator	Address	Location of mine
Inyo County		
Hoot Owl Iron Deposit-C. F. Knotts	Trona	Inyokern
L. S. McGirk	Shoshone	Shoshone
Santa Cruz County		
Coast Metals & Reduction Co.	Rob-Roy, c/o Watsonville	Aptos

LEAD

1940 Directory of Producers

Mine	Operator	Address	Postoffice of mine
Inyo County			
Columbia No. 2	Shoshone Mines, Inc.	Tecopa	Tecopa
Gold Bottom	Gold Bottom Mines, Inc.	Box 1556, Bakersfield	Trona
Golden Treasure (Ashford)	J. P. Madison	Death Valley	Shoshone
Montezuma	Louis Cantua	Big Pine	Big Pine
Wahoo	William P. Braun	Darwin	Darwin
	Paul Brown	Keeler	Keeler
	Frank Gales	Keeler	Keeler
	Old Gold Mines Co.	Trona	Trona
	Jack Greaves	Olancha	Olancha
	John O'Neil and Dennis McFall	Trona	Trona
	Theo. Peterson	Darwin	Darwin
Kern County			
Big Blue and Lady Belle	Kern Mines, Inc.	Kernville	Kernville
Mariposa County			
Bondurant	Bondurant Mining & Mlng Co.	405 Montgomery St., San Francisco	Coulterville
Mono County			
	William T. Holser	Benton	Benton
Orange County			
Silverado (Blue Light)	Blue Light Silver Mines, Inc.	Fullerton	Fullerton
Placer County			
Alabama	Alabama Calif. Gold Mines Co.	Auburn	Penryn
Plumas County			
Walker	Walker Mining Co.	821 Kearns Bldg., Salt Lake City, Utah	Walkermine
Riverside County			
Black Eagle	Imperial Smelting & Ref. Co.	811 W. 7th St., Los Angeles	Indio
San Bernardino County			
Blue Buzzard	Whitney & Bauer	Nipton	Nipton

Operator	Product	Address	Location of quarry
Alameda County			
Westvaco Chlorine Prod. Corp.	a, d	Newark	Newark
El Dorado County			
Auburn Chemical Lime Co., Ltd.	a, b	Auburn	Newcastle
Diamond Springs Lime Co.	a, b, c	Diamond Springs	Diamond Springs
El Dorado Limestone Co., J. H. Bell, Pres.	b	Shingle Springs	Shingle Springs
Pac. Portland Cement Co., Cons.	b	417 Montgomery St., San Francisco	Auburn
Imperial County			
Tycrete Chemical Corp.	b	Chula Vista	Chula Vista
Inyo County			
Blue Star Talc Mine, Ltd.	a, b	840 S. San Julian St., Los Angeles	Zurich
Los Angeles County			
W. F. Glasser, Inc.	b	713 N. Sepulveda, Brentwood Heights, Los Angeles	
Sheba Fertilizer Co., Eugene L. Graves	b, c	4358 Elizabeth St., Bell	Palmdale
Riverside County			
Howard Small	b, c	311 Main St., Riverside	Riverside
San Bernardino County			
Cal. Portland Cement Co.	a	601 W. 5th St., Los Angeles	Colton
Chubbuck Lime Co., Chas. I. Chubbuck	a, b, c	5000 Worth St., Los Angeles	Chubbuck
Victorville Lime Rock Co.	b	2424 Enterprise St., Los Angeles	Victorville
San Luis Obispo County			
Charles Taylor	b	Salinas	Cambria
San Mateo County			
Pacific Portland Cement Co.	c, d	417 Montgomery St., San Francisco	Redwood City
Santa Clara County			
Bay Shell Co.	c, d	503 Market St., San Francisco	Alviso
L. H. Beck	c, d	Box 113, Colma	Alviso
W. B. Ortley Shell Co.	d	Alviso	Alviso
Permanente Corp.	a, b	Box 29, San Jose	Los Altos
Santa Cruz County			
Henry Cowell Lime and Cement Co.	a, b	2 Market St., San Francisco	Santa Cruz
Pacific Limestone Prod. Co.	b, c	Spring St., Santa Cruz	Santa Cruz
Santa Cruz Portland Cement Co.	b	Crocker Bldg., San Francisco	Davenport
Tuolumne County			
McLean Quarry, W. S. McLean's	a	419 Bayshore Blvd., San Francisco	Columbia
Walter C. Sundburg	b	Box 653, Sonora	Sonora
U. S. Lime Products Corp.	a, b	58 Sutter St., San Francisco	Sonora

a. Producer of burnt lime. b. Producer of limestone. c. Agricultural lime. d. Shells. e. Marl.

LITHIA

Operator	Address	Location of mine
American Potash & Chemical Corp.	Trona	Trona

MAGNESITE

Operator	Address	Location of mine
Alameda County		
Westvaco Chlorine Prod. Corp.*	Newark	Newark
Imperial County		
Tycrete Chemical Corp.	Chula Vista	Chula Vista
Santa Clara County		
Westvaco Chlorine Prod. Corp., Lessee, Western Magnesite Mine	Newark	Red Mountain
Stanislaus County		
Westvaco Chlorine Prod. Corp., Lessee, Bald Eagle Mine	Newark	Gustine

* Magnesium oxide reduced from sea water and used as magnesite.

MAGNESIUM SALTS

Operator	Product	Address	Location of plant
Alameda County			
Westvaco Chlorine Prod. Corp.	Hydroxide	Newark	Newark
San Diego County			
Westvaco Chlorine Prod. Corp.	Chloride	Newark	San Diego
San Mateo County			
Marine Magnesium Prod. Corp., R. E. Clarke	Carbonate hydroxide and oxide	South San Francisco	South San Francisco
Plant Rubber & Asbestos Works	Carbonate	537 Brannan St., San Francisco	Redwood City

MANGANESE ORE

Operator	Address	Location of mine
San Bernardino County		
S. F. Brock	Barstow	Barstow
Natural Resources, Inc.	1137 S. Hayworth Ave., Los Angeles	Baker
Stanislaus County		
West Coast Chrome Co., Chas. Hall and J. A. Thornson	Box 512, Patterson	Patterson

MARBLE (Including Onyx and Travertine)

Operator	Product	Address	Location of quarry
Los Angeles County			
W. F. Glasser, Inc.	a	713 N. Sepulveda	Brentwood Heights
San Bernardino County			
Vaughan Marble Quarry, Arthur C. Vaughan, Pres.	a	990 Magnolia Ave., Los Angeles	Cadiz
Santa Barbara County			
G. Antolini	b	111 E. Gutierrez St., Santa Barbara	Tijguas
Solano County			
United Quarries, Inc.	c	445 Bayshore Blvd., San Francisco	Cement
Tuolumne County			
Columbia Marble, Inc.	a	85 2d St., San Francisco	Columbia

a. Marble. b. Limestone, building and flagstone. c. Onyx and travertine.

MICA

Operator	Address	Location of mine
Inyo County		
L. S. McGirk	Shoshone	Shoshone

Operator	Address	Location of spring
Butte County		
Richardson Mineral Springs, Lee Richardson, Mgr.	Richardson Springs	Richardson Springs
Calveras County		
Mok-Hill Mineral Springs, Cavanaugh & Pierovich	Jackson	Mokelumne Hill
Colusa County		
Cooks Springs, Don Mason	Williams	Cooks Springs
Contra Costa County		
Alhambra Water Co.	Martinez	Martinez
Fox Water Co.	675 37th St., Oakland	Oak Springs
Lake County		
Adams Mineral Springs, Clarence Prather	Adams, via Middletown	Adams
Bartlett Springs Co., J. H. Heller, Sec'y	1663 32d Ave., San Francisco	Bartlett Springs
Howard Hot Springs, J. P. Francisco	Middletown	Middletown
Norman Mineral Springs, H. C. Norman, Mgr.	Middletown	Middletown
Witter Medical Springs, W. E. Whitaker	1234 5th Ave., San Francisco	Witter Springs
Los Angeles County		
Deep Rock Artesian Water	4416 York Blvd., Los Angeles	Los Angeles
Elysian Spring Water Co.	1536 Baxter, Los Angeles	Los Angeles
Frespuro Artesian Water	4430 York Blvd., Los Angeles	Los Angeles
Holly Spring Water	2298 Holly Dr., Los Angeles	Los Angeles
Magnetic Spring Water Co.	936 Palm Ave., Sherman	Los Angeles
Mission Spring Water Co.	8938 Keith, Hollywood	Hollywood
Mountain Spring Water Co.	226 S. Avenue 54, Los Angeles	Los Angeles
Pure-lax Mineral Water Co.	3640 Griffin, Los Angeles	Los Angeles
Sparklett Bottled Water Corp.	4500 York Blvd., Los Angeles	Los Angeles
Marin County		
Purity Spring Water Co.	2032 Kearny St., San Francisco	
Napa County		
Calistoga Bottling Works, Louis Martinelli	Calistoga	Calistoga
Napa Soda Springs Co., G. H. T. Jackson	315 Montgomery St., San Francisco	Napa
Napa Vichy Springs, V. Frugoli	225 Bay St., San Francisco	Napa
Samuels Soda Springs, Mrs. Robert J. Little	Monticello	Monticello
Orange County		
La Vida Mineral Springs Co.	Route 1, Placentia	Carbon Canyon
Placer County		
Kilaga Water Co.	Lincoln	Valley

Riverside County		
Beulah Springs, Oscar C. McNicholl	Arlington	Arlington
San Bernardino County		
Arrowhead Hot Springs, Calif. Cons. Water Co.	1566 E. Washington Blvd., Los Angeles	Arrowhead
San Diego County		
Cuyamaca Mineral Water, San Diego Ice & Cold Storage Co.	67 8th St., San Diego	San Diego
Rock Springs Co., E. S. Walck	Route 2, Box 442, Escondido	Escondido
San Francisco County		
Blue Crest Beverage Co., Morris & Paul Greenberg	265 Naples St., San Francisco	San Francisco
San Luis Obispo		
Crystal Spring Water Co., W. R. Hudson	Route 2, Box 11, San Luis Obispo	San Luis Obispo
Santa Barbara County		
Veronica Mineral Springs Co.	699 Brannan St., San Francisco	Santa Barbara
Siskiyou County		
Coca Cola Bottling Co., Fred J. Meamber, Prop.	Yreka	Little Shasta
The Shasta Water Co.	6th and Brannan Sts., San Francisco	Dunsmuir
Sonoma County		
Agua Caliente Springs Co., T. H. Corcoran, Prop.	Agua Caliente	Agua Caliente
Bareal Springs, John Kolling	Preston	Preston
Fetters Mineral Springs, George Fetters	Fetters Springs	Fetters Springs

MOLYBDENUM ORE

Mine	Operator	Address	Location of mine
Pine Creek Mine	United States Vanadium Corp.	Bishop	Bishop

PLATINUM

Principal Platinum Producers in California in 1940

Operator	Address	Location of mine
Amador County		
Gold Hill Dredging Co.	351 California St., San Francisco	Camanche
Butte County		
Yuba Cons. Gold Fields Co.*	351 California St., San Francisco	Rio Bonito
Merced County		
Merced Dredging Co.	Mills Bldg., San Francisco	Snelling
Yuba Consolidated Gold Fields*	351 California St., San Francisco	Snelling
Placer County		
Midland Co.	733 Dwight Way, Berkeley	Lincoln
Sacramento County		
Cosumnes Gold Dredging Co.	351 California St., San Francisco	Sloughhouse
Natomas Co.*	Forum Bldg., Sacramento	Natomas
Stanislaus County		
La Grange Gold Dredging Co.	Mills Bldg., San Francisco	La Grange
Shasta County		
Roaring River Gold Dredging Co.	351 California St., San Francisco	Cottonwood
Tehama County		
Tehama Dredging Co.	Box 727, Anderson	Bend
Trinity County		
Cinco Minersa Co.	Box 212, Oroville	Hayfork
Junction City Mining Co.	Junction City	Junction City
Yuba County		
Yuba Consolidated Gold Fields*	351 California St., San Francisco	Hammonton

* Platinum metals not sold in 1940.

POTASH

Operator	Address	Location of plant
San Bernardino County		
American Potash and Chemical Co.	Trona	Trona

PUMICE OR VOLCANIC ASH

Operator	Product	Address	Location of property
Amador County			
Industrial Minerals & Chemical Co.	b	836 Gilman St., Berkeley	Edwin
Inyo County			
Chas. Brown	a	Shoshone	Shoshone
Little Lake Pumice Co.	a	1513½ W. Pico Blvd., Los Angeles	Coso Junction
Pumice Products Co., Paul H. Splane	a	4031 Goodwin Ave., Glendale	Brown and Little Lake
Kern County			
Calsilico Corp., G. A. Reynolds	b	445 S. Amalia Ave., Los Angeles	Cantil
Cudahy Packing Co.	b	803 Macy St., Los Angeles	Ceneda
Madera County			
Calif. Industrial Minerals, c/o Forrest S. Taylor	b	Friant	Friant
Elmer Erickson	a	Friant	Friant
Pacific Pumice Materials Co., W. E. Schlink	a	1047 N. Hunter St., Stockton	Friant
Modoc County			
Glass Mt. Volcolite Co., H. W. Free	b, c	Tionesta	Tionesta
Mono County			
Alexander Jamieson	d	Box 20, Big Pine	Big Pine
Napa County			
Basalt Rock Co.	a	8th St., Napa	Monticello
C. Cicero	a	Box 446, Napa	Monticello
San Luis Obispo County			
Red Eagle Mine, M. L. Francis	b	Creston	Creston
Siskiyou County			
Glass Mt. Volcolite Co., H. W. Free	a, c, d	Tionesta	Glass Mountain
Ray N. Fouch	a, c, d	1123 8th St., Sacramento	Glass Mountain
Klamath Concrete Pipe Co.	a	Klamath Falls, Ore.	Glass Mt.

a. Pumice, aggregate. b. Volcanic ash. c. Scoria. d. Pumice for scouring brick.

PYRITE

Operator	Address	Location of mine
Shasta County		
Mountain Copper Co., Wm. F. Kett, Mgr.	351 California St., San Francisco	Matheson

QUICKSILVER

Principal Producers in California for 1940, out of a Total of 102 Operating Properties

Mine	Operator	Address	Postoffice of mine
Contra Costa County			
Mt. Diablo	Bradley Mining Co.	Crocker Bldg., San Francisco	Clayton
Fresno County			
Archer	Joseph Byles & Sons	Coalinga	Coalinga
Mercy	Vulcan Mercury Mining Co.	Dos Palos	Dos Palos
Kern County			
Cuddeback	Walabu Mining Co.	Box 1230, Bakersfield	Keene
Kings County			
Kings	Bert Harvey	Box 366, Paso Robles	Parkfield
Lake County			
Big Chief	L. J. Pockman	c/o Hyman Michels, 625 Market St., San Francisco	Anderson Springs
Great Western	Bradley Mining Co.	Crocker Bldg., San Francisco	Middletown
Helen	Morgan North	750 12th St., Oakland	Middletown
Mirabel	Mirabel Quicksilver Co.	Middletown	Middletown
Sulphur Bank	Bradley Mining Co.	Crocker Bldg., San Francisco	Lower Lake
Napa County			
Aetna	J. F. Knapp	1401 Park Ave., Oakland	Aetna Springs
Ivanho	Harry Patten	Calistoga	Pope Valley
Knoxville	Geo. E. Gamble	1431 Waverly St., Palo Alto	Monticello
Manhattan Mine	Chas. Wilson & W. M. Hickox	Monticello	Monticello
Oat Hill	Oat Hill Mine, Inc.	10 Penthouse, Mills Bldg., San Francisco	Aetna Springs
Oat Hill Extension	Zack Anderson	Middletown	Aetna Springs
San Benito County			
Aurora	North American Mining Co.	75 Federal St., Boston, Mass.	Idria
El Rey	Dan A. Williams	221 Katherine St., Salinas	Llanada
New Idria	New Idria Quicksilver Mining Co.	Mills Bldg., San Francisco	Idria
Panoche	Panoche Quicksilver Mining Co., P. D. Burtt	1018 Mills Bldg., San Francisco	Llanada
Stayton Quicksilver	R. B. Knox	Hollister	Hollister
Valley View	Louis Sciochetti	c/o Ruffino Telleria, Paicines	Llanada
Wonder	Paul Gonzales	Box 268, Soledad	Idria
San Bernardino County			
Bimetallic	A. B. Day	Atolia	Atolia

San Luis Obispo County			
Buena Vista	E. Julian Phillips	Box 750, Salinas	Paso Robles
Deer Trail	Pedro Ferrel	211 E. Mill St., Santa Maria	Huasna
Klau	Klau Mine, Inc.	Mills Bldg., San Francisco	Adelaide
La Libertad	Oscar & Howard Mining Co., Howard Tripp	Paso Robles	Adelaide
Santa Barbara County			
Los Prietos	Falcon Mercury Co.	Box 117, Santa Barbara	Santa Barbara
Red Rock	Red Canyon Mining Co.	1275 Subway Terminal Bldg., Los Angeles	Los Olivos
Santa Clara County			
Guadalupe	Laco Mining Co., H. N. Mason	Route 3, Box 412, Los Gatos	Los Gatos
New Almaden	New Almaden Corp., C. N. Schuette, Gen. Mgr.	Call Bldg., San Francisco	Almaden
New Almaden Dump	Dave and Ben Black	Almaden	Almaden
Sonoma County			
Cloverdale	Schor, Rocca & Garcia	Cloverdale	Cloverdale
Contact	Contact Mining Co.	Bank of America Bldg., Santa Rosa	Pine Flat
Culver Bear	C. A. Baumester*	Cloverdale	Cloverdale
Culver Bear	American Concrete Pipe & Steel Co.	4635 Firestone Blvd., Los Angeles	Cloverdale
Mt. Jackson	Sonoma Quicksilver Mine, Inc.	58 Sutter St., San Francisco	Guerneville
Trinity County			
Altoona	Altoona Quicksilver Mining Co., E. R. Frowenfeld, Pres.	2446 Washington St., San Francisco	Castella
Yolo County			
Harrison	Vince & Virne Harrison	Lower Lake	Rumsey
Reed	Bradley Mining Co.	922 Crocker Bldg., San Francisco	Rumsey

* First part of 1940.

SALT

Operator	Address	Location of plant
Alameda County		
American Salt Co., Mrs. Mary Marsicano	2970 Lake St., San Francisco	Mt. Eden
Leslie Salt Co.	310 Sansome St., San Francisco	Newark and Mt. Eden
Oliver Bros. Salt Co.	Mt. Eden	Mt. Eden
Butte County		
Richardson Mineral Springs, Lee Richardson, Mgr.	Richardson Springs	Richardson Springs
Imperial County		
Imperial Salt Co.	4000 E. Washington Blvd., Los Angeles	Calipatria
Mullet Island Salt Works	Niland	Niland
Kern County		
Long Beach Salt Co.	P.O. Box 28, Long Beach	Saltdale
Los Angeles County		
Long Beach Salt Co.	P.O. Box 28, Long Beach	Long Beach
Modoc County		
Surprise Valley Salt Works, Joshua H. Hutchinson	Box 26, Cedarville	Lake City
Mono County		
C. C. Miller	837 W. Los Angeles St., Baldwin Park	Mono Lake
Monterey County		
Monterey Bay Salt Co., E. C. Vierra, Mgr.	Moss Landing	Moss Landing
Orange County		
The Irvine Co.	Tustin	Tustin
San Bernardino County		
California Rock-Salt Co.	2465 Hunter St., Los Angeles	Amboy
Rock Salt Products Co.	845 El Centro St., South Pasadena	Salt Marsh
San Diego County		
Western Salt Co.	1245 National Ave., San Diego	San Diego
San Mateo County		
Stauffer Chemical Co.	636 California St., San Francisco	Redwood City

SANDSTONE

Operator	Address	Location of quarry
Colusa County		
H. F. Galbreath	1668 Lincoln St., Berkeley	
Los Angeles County		
William C. Buehler	1555 Sunset Ave., Pasadena	Rosamond
W. F. Glasser, Inc.	713 N. Sepulveda, Brentwood Heights, Los Angeles	Brentwood Heights
Monterey County		
Carmel Stone Quarry, A. L. Possadori	Carmel	Carmel
Sierra Quarry, H. E. Rogers	Box 136, Carmel	Carmel
Napa County		
H. F. Galbreath	1668 Lincoln St., Berkeley	
San Luis Obispo County		
Mora Bros.	Box 121, Cambria	Cambria
Shasta County		
H. F. Galbreath	1668 Lincoln St., Berkeley	Ono

SILICA

Operator	Product	Address	Location of mine
Contra Costa County			
Hazel-Atlas Glass Co. of California, Ltd.	b	89th and G Sts., Oakland	Summerville
Silica Co. of California, Ltd.	b	Brentwood	Brentwood
Orange County			
Arnold Clay Mine, I. P. Arnold	b	1846 W. 83d St., Los Angeles	El Toro
Placer County			
Harry McCormack	a	Alta	Alta
Riverside County			
P. J. Weisel, Inc.	b	La Habra	Corona
San Bernardino County			
Gladding, McBean & Co.	a	2901 Los Feliz Blvd., Los Angeles	
Temescal Clay Co.	c	5601 S. Boyle Ave., Los Angeles	Victorville
San Diego County			
American Radiator & Standard Sanitary Corp.*	a	Campo	Campo

a. Quartz. b. Glass sand. c. Quartzite.
* Will produce in 1941.

SILLIMANITE-ANDALUSITE-CYANITE GROUP

Operator	Product	Address	Location of mine
Imperial County			
Vitrefrax Co.	Cyanite	500 Pacific St., Vernon, Los Angeles	Ogilby
Mono County			
Champion Sillimanite, Inc.*	Andalusite	Box 117, Laws	Mocalno

* No shipments in 1940; development work only.

SILVER

1940 Directory of Producers

Mine	Type of mine	Operator	Address	Postoffice of mine
Amador County				
Argonaut	a	Argonaut Mining Co., Ltd.	Jackson	Jackson
Central Eureka and Old Eureka	a	Central Eureka Mining Co.	Sutter Creek	Sutter Creek
Butte County				
Surcease	a	Hoefling Bros.	Box 786, Sacramento	Oroville
Calaveras County				
Carson Hill	a	Carson Hill Gold Mining Corp.	Melones	Melones
Sheep Ranch	a	St. Joseph Lead Co.	Sheepranch	Sheepranch
Mountain King	a	Jumbo Cons. Mining Co.	425 Title Insurance Bldg., Los Angeles	Copperopolis
Inyo County				
Columbia No. 2	c	Shoshone Mines, Inc.	Tecopa	Tecopa
Del Norte—Skidoo	a	Del Norte Mining Co. and lessees	Mojave	Trona
Pine Creek	k	U. S. Vanadium Corp.	30 E. 42d St., New York, N. Y.	Bishop
Reward (Brown Monster)	a	Basil Prescott et al.	Lone Pine	Independence
Wahoo	c	William P. Braun	Darwin	Trona
----------	c	Jack Greaves	Olancha	Olancha
Kern County				
Big Blue and Lady Belle	a	Kern Mines, Inc.	Kernville	Kernville
Cactus Queen	b	Cactus Mines Co.	Rosamond	Rosamond
Four Jacks	a	Eric Fallen et al.	Mojave	Mojave
Golden Queen	a	Golden Queen Mining Co.	Mojave	Mojave
Lodestar	a	Lodestar Mining Co.	Mojave	Mojave
Standard	a	B. F. Forbes and lessees	Mojave	Mojave
Starlight	b	Marion P. Raab	Mojave	Mojave
Tropico	a	Burton Bros. and lessees	Mojave	Mojave
Los Angeles County				
Governor	a	Governor Mine Co.	725 S. Figueroa St., Los Angeles	Acton

Mono County				
Comanche	a	F. L. Main	2875 Hollyride Dr., Los Angeles	Bodie
Green Monster	a	Moline Bros.	Dyer, Nevada	Dyer, Nev.
Standard	a	Roseklpi Mines Co.	206 Sansome St., San Francisco	Bodie
----------	e, g	William Holser	Benton	Benton
Napa County				
Grigsby (Palisades)	b	Graham Loftus Oil Corp.	811 W. 7th St., Los Angeles	Calistoga
Nevada County				
Empire Star Group	a	Empire Star Mines Co., Ltd.	14 Wall St., New York, N. Y.	Grass Valley
Golden Center	a	Cooley Butler	745 Rowan Bldg., Los Angeles	Grass Valley
Idaho Maryland	a	Idaho Maryland Mines Corp.	Box 1028, Grass Valley	Grass Valley
Lava Cap	a	Lava Cap Gold Mining Corp.	Box 780, Nevada City	Nevada City
Spanish	a	Bradley Mining Co.	425 Crocker Bldg., San Francisco	Washington
Orange County				
Silverado (Blue Light)	f	Blue Light Silver Mines, Inc.	Fullerton	Fullerton
Placer County				
Alabama	a	Alabama Calif. Gold Mines Co.	Auburn	Auburn
Plumas County				
Walker	g	Walker Mining Co.	821 Kearns Bldg., Salt Lake City, Utah	Walkermine
Riverside County				
Black Eagle	c	Imperial Smelting & Ref. Co.	811 W. 7th St., Los Angeles	Indio
Sacramento County				
Natomas	e	Natomas Company	Box 1197, Sacramento	Folsom
San Bernardino County				
Gold Crown	a	Gold Crown Mining Co.	Twentynine Palms	Twentynine Palms
Kelly	a	Frank W. Royer et al.	Red Mountain	Red Mountain
Silver King and Waterloo Tails	h	J. B. Anthony	Box 88, Daggett	Yermo
Stonewall Jackson	a	Martin A. Kiwisar	Jean, Nev.	Jean, Nev.
Zenda	h	Lawrence Coke	Box 47, Yermo	Yermo
Shasta County				
Greenhorn	a	Willow Creek Mines, Inc.	Redding	French Gulch
Iron Mountain	a	The Mountain Copper Co., Ltd.	351 California St., San Francisco	Matheson
Sierra County				
Original Sixteen to One	a	Original Sixteen to One Mine, Inc.	1611 Russ Bldg., San Francisco	Alleghany
Tuolumne County				
Eagle Shawmut	a	Miller and Clemson	4800 Santa Fe Ave., Los Angeles	Chinese Camp
Yuba County				
Pennsylvania	a	Empire Star Mines Co., Ltd.	14 Wall St., New York, N. Y.	Brown's Valley
Yuba Unit	e	Yuba Cons. Gold Fields	351 California St., San Francisco	Hammonton

a. Gold mine. b. Gold-silver mine. c. Lead-silver mine. e. Gold dredge. f. Silver-lead-zinc mine. g. Copper mine. h. Tailings dump. k. By-product tungsten ore.

SLATE

Operator	Product	Address	Location of quarry
El Dorado County			
Pacific Minerals Co., Ltd.	b, c	337 10th St., Richmond	Chili Bar
Los Angeles County			
Blue Goose Quarry, Robert Cox	c	1975 Lundy Ave., Pasadena	Pasadena
Tuolumne County			
W. S. McLean Estate, Inc.	b	419 Bayshore Blvd., San Francisco	Hetch Hetchy

b. Granules. c. Flagging.

SOAPSTONE AND TALC

Operator	Product	Address	Location of mine
Butte County			
McLean Talc Deposit, W. S. McLean Est.	a	San Francisco	McLean Spur
El Dorado County			
Jim Bernett	a	Shingle	Shingle
Industrial Minerals & Chemical Co.	a	836 Gilman St., Berkeley	Latrobe
Pacific Minerals Co., Ltd., Chas. S. Renwick, Jr.	a	337 10th St., Richmond	Shrub
Inyo County			
Blue Star Talc Mine, Ltd.	b	840 S. San Julian St., Los Angeles	Kingston Mountain
Wm. Bonhan and W. V. Skinner	b	Lone Pine	Lone Pine
Pacific Coast Talc Co.	b	2149 Bay St., Los Angeles	Death Valley
Pomona Tile Mfg. Co.	b	Pomona	Death Valley
Sierra Talc Co., Franklin Booth, Mgr.	b	428 Union League Bldg., Los Angeles	Keeler
San Bernardino County			
Moorhouse Talc Co.	b	3215 W. 6th St., Los Angeles	Shoshone
Pacific Coast Talc Co.	b	2149 Bay St., Los Angeles	Silver Lake
Southern Calif. Minerals Co., W. S. Skeoch	b	320 Mission Rd., Los Angeles	Kingston Mt.
Western Talc Co.	b	1901 E. Slauson Ave., Los Angeles	Death Valley
Shasta County			
C. O. Benson	b	Golden Eagle Hotel, Redding	
Shasta Talc Mines, Henry Jacoby	b	939 Central Ave., Alameda	
Tuolumne County			
Walter C. Sundburg	a	Box 653, Sonora	Sonora

a. Soapstone. b. Talc.

Operator	Product	Address	Location of plant
Inyo County			
Natural Soda Products Co.	a, d	405 Montgomery St., San Francisco	Keeler
Pacific Alkali Co.	a, d	1206 Pacific Mutual Bldg., Los Angeles	Bartlett
San Bernardino County			
American Potash & Chemical Co.	a, c	Trona	Trona
Desert Chemical Co.*	c	4031 Goodwin Ave., Los Angeles	Amboy
West End Chemical Co.	a	Latham Square Bldg., Oakland	West End

a. Soda ash. c. Salt cake. d. Trona.
* Will be in production in 1941.

STONE, MISCELLANEOUS

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

NOTE.—The California State Highway Commission, the various counties, U. S. Forest Service and U. S. Bureau of Public Roads produce both crushed rock and sand and gravel in various places in the State used in construction and maintenance of highways, but not specified in this listing.

Operator	Product	Address	Location of pit or quarry
Alameda County			
California Rock & Gravel Co.	a	500 Call Bldg., San Francisco	Livermore
J. Catucci	a, b	1212 18th Ave., Oakland	Oakland
Heafey-Moore Co., Leona Quarry	b	344 High St., Oakland	Oakland
Henry J. Kaiser Co.	a, b	1522 Latham Square Bldg., Oakland	Radum
Langdon Molding Sand, J. H. Langdon	c	R.F.D., Box 89, Niles	Decoto
Leslie Salt Co.	b	310 Sansome St., San Francisco	Newark
Red Shale Quarry, W. S. McLean	d	419 Bayshore Blvd., San Francisco	Arroyo Mocho
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Eliot and Niles
Alfred W. Petersen	a	Box 943, Livermore	Livermore
Thos. B. Russell Quarry, T. B. Russell	b	1192 Russell Way, Hayward	Hayward
San Leandro Rock Co., Lake Chabot Quarry	b	2485 Washington St., San Leandro	Lake Chabot
Superior Rock Co.	b	Broadway and McAdams St., Oakland	Oakland
Amador County			
Charles Ayers	a	Jackson	Jackson
Butte County			
Bechtel-Kaiser Rock Co., R. J. Kennedy, Mgr.	a, b	Oroville	Oroville
Dry Creek Sand & Gravel Plant, F. W. Donner	a	Chico	Cherokee Flat
J. E. Johnson Rock Co.	b	Weber Ave. and E St., Stockton	Chico
McLean's Quarry, W. S. McLean	d	419 Bayshore Blvd., San Francisco	McLean Spur
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Oroville
Calaveras County			
R. Nielsen	a	San Andreas	San Andreas
Pacific Minerals Co., Ltd.	d	337 10th St., Richmond	Angels
Contra Costa County			
Antioch Asphalt Sand Co.	a	2008 Mission St., San Francisco	Antioch
Basalt Rock Co.	a	8th St., Napa	Antioch
Blake Bros. Co., Anson Blake	b	204 Balboa Bldg., San Francisco	Point Richmond
Hutchinson Co., Stege Quarry	b	329 17th St., Oakland	Stege
Henry J. Kaiser Co.	a	1522 Latham Square Bldg., Oakland	Newlove
The Roberts Bros.	c	Pittsburg	Clayton
Silica Co. of Calif., Ltd.	c	Brentwood	Brentwood
E. Stamm & Sons	a	Antioch	Antioch
El Dorado County			
Diamond Springs Lime Co.	b	Diamond Springs	Diamond Springs

Fresno County			
Central Rock & Sand Co.	a, b	Sanger	Sanger
Central Valley Const. Co.	a	Blackstone & Indianapolis, Fresno	Fresno
Grant-Pacific Rock Co.	a, b	Box 656, Fresno	El Prado
Southern California Edison	a	Edison Bldg., Los Angeles	
Stewart & Nuss	a, b	410 Thorne St., Fresno	Herndon
Volpa Bros.	a	428 W. Whites Bridge, Fresno	Fresno
Glenn County			
E. B. Bishop	a	Box 325, Orland	Wyo
Southern Pacific Co.	a	65 Market St., San Francisco	Wyo
Humboldt County			
D. A. Boyd	a	R. F. D., Arcata	Arcata
Tom Hull	a	Eureka	Eureka
Mercer Fraser Co.	a	2d and Commercial St., Eureka	Essex and Fernbridge
Northwestern Pacific R.R. Co., Wm. N. Neff, Gen. Sup't	a	Sausalito	Sausalito
Imperial County			
R. M. Albee	a	R.F.D. 2, Box 75, Brawley	Holtville
Brawley Concrete Co.	a	Brawley	Brawley
Nixon Pipe Yard	a	Seeley	Seeley
Charles L. Wigg	a	Brawley	Brawley
W. M. Winn	a	Box 1136, Brawley	El Centro
Inyo County			
Inyo Marble Co.	a	726-732 E. 29th St., Los Angeles	Lone Pine
Kern County			
Bakersfield Rock and Gravel Co.	a, b	Box 395, Station A, Bakersfield	Bakersfield
C. W. Hartman	a, b	W. Oak St., Bakersfield	Bakersfield
Kern Rock Co., Ltd.	a, b	Box 1697, Bakersfield	Kern River
Valley Rock & Sand Co.	a	804 Irene St., Bakersfield	Bakersfield
Lake County			
Chas. Kuppinger	a	Lakeport	Lakeport
Lassen County			
Red River Lumber Co.	a	Westwood	Westwood
Los Angeles County			
Arrow Rock Co.	a	Box 155, Monrovia	Monrovia
A. T. & S. F. R.R., I. L. Hibbard, Gen. Mgr.	a	609 Kerckhoff Bldg., Los Angeles	Forbes
Guy F. Atkinson Co., et al.	b	Box 259, Long Beach	Santa Catalina
Azusa Rock & Sand Co.	a, b	Rural Delivery, Azusa	Azusa
Richard R. Ball	a	Box 96, Walteria	Walteria
Blue Diamond Corp., Ltd.	a	1650 S. Alameda St., Los Angeles	El Monte and Roscoe
Wm. J. Bonfield	g	2008 Laurel Canyon Rd., Los Angeles	Hollywood
Chandler Palos Verdes S. & G., L. Chandler	a, b	Lomita	Lomita

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag and volcanic cinder. f. Tube-mill pebbles. g. Decomposed granite.

* Consolidated July 1, 1938 to form Grant-Pacific Rock Co.

STONE, MISCELLANEOUS—Continued

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

Operator	Product	Address	Location of pit or quarry
Los Angeles County—Continued			
City Rock Co.	a, b	Box A, Sunland	Sunland
Consolidated Rock Products Co.	a, b	2730 S. Alameda St., Los Angeles	Whittier and Fullerton
Ducey & Atwood Rock Co., R. K. Atwood, Pres.	a, b	Box 194, East Pasadena	East Pasadena
Eastside Building Materials Co.	a	8830 Santa Monica Blvd., Los Angeles	
Eaton Canyon Rock & Sand Co.	a, b	Box 95, East Pasadena	East Pasadena
W. F. Glasser, Inc.	b	713 N. Sepulveda, Brentwood Heights, Los Angeles	Brentwood Heights
Graham Bros.	a, b	3245 Fowler Ave., Los Angeles	Catalina Island and Roscoe
Granite Material Co.	g	8200 Tujunga Ave., No. Hollywood	Roscoe
John D. Gregg	a, b	Box 110, Whittier	Whittier
Lindauer Corp.	a	Box 208, La Habra	La Habra
Los Angeles Decomposed Granite Co.	g	2171 W. Washington, Los Angeles	Los Angeles
Maceo-Case Construction Co.	b	815 N. Paramount Blvd., Clearwater	Santa Catalina
Manning Bros. Rock & Sand Co.	a, b	Irwindale	Irwindale
Moe Bros	g	8170 Lauremont Dr., Hollywood	Laurel Canyon
Pacific Rock & Gravel Co.	a, b	800 Lane Mortgage Bldg., 208 W. 8th St., Los Angeles	
Rohl-Connolly Co.	b	4351 Alhambra Ave., Los Angeles	Catalina Island
Security Material Co.	b	1131 N. Highland Ave., Los Angeles	Los Angeles
Edwin Sidebotham & Son, Inc., Sidebotham Sand Plant	a	McFarland and L Sts., Wilmington	Lomita
J. H. Weadle	a, b	Monrovia	Monrovia
Marin County			
Daniels Const. Co.	b	503 Market St., San Francisco	San Rafael
Hutchison Co.	b	329 17th St., Oakland	San Quentin
Marin Gravel Co.	a	Point Reyes	Point Reyes
Mariposa County			
D. W. Dukes	a	Incline	Incline
Frank B. Marks & Sons	a, b	Newman	Yosemite
D. H. Miles	b	Mariposa	Mariposa
Yosemite National Park	a, b	Yosemite	Yosemite Nat'l Park
Mendocino County			
Fork Gravel Co., Kirby Ford	a	Ukiah	Ukiah
John Freitas	a	Ukiah	Ukiah
Merced County			
Bair Creek Sand & Gravel Co., J. W. Huffman	a	Merced	
Clyde Jones	a	Winton	Winton
Modoc County			
Great Northern Railway, A. E. Knight, Supt.	e	Klamath Falls, Ore.	Mammoth

Mono County			
L. A. Bureau of Water Works & Supply, H. A. Van Norman	a	207 S. Broadway, Los Angeles	
Monterey Sands, Ralph Parsons	a	Box 88, Marina	Marina
Monterey County			
Del Monte Properties, C. S. Olmsted	a, c, d	Del Monte	Del Monte
M. J. Murphy	a	Monte Verde and 9th Sts., Carmel	Carmel
Pacific Coast Aggregates, Inc.	a	85 2d St., San Francisco	Lapis and Prattco
S. Ruthven, Seaside Sand Pit	a	Seaside	Seaside
Napa County			
Basalt Rock Co.	b	8th St., Napa	Napa
Juarez Quarry, M. G. Reidenbach	b	Napa	Napa
Nevada County			
Grass Valley Rock & Sand Co., D. T. Brown	a, b	Grass Valley	Grass Valley
Orange County			
E. M. Barris Sand & Gravel Co.	a	Newport Beach	Newport Beach
California Rock Co.	a	Rural Delivery, Orange	Orange
Consolidated Rock Products Co.	a	2730 S. Alameda St., Los Angeles	Fullerton and Orange
Fowler Sand & Gravel Co.	a	1178 S. Flower St., Santa Ana	Santa Ana
Graham Bros.	a	3425 Fowler Ave., Los Angeles	San Juan Capistrano
B. A. Stoffel	a	Anaheim	Anaheim
Placer County			
Roseville Sand Co.	a	Box 531, Roseville	Roseville
Plumas County			
Western Pacific R.R. Co., E. W. Mason, Gen. Sup't.	b	Mills Bldg., San Francisco	
Riverside County			
A. T. & S. F. R.R. Co., I. L. Hibbard, Gen. Mgr.	b	609 Kerckhoff Bldg., Los Angeles	Box Springs
Concrete Rock & Sand Co.	a, b	899 La Cadena St., Colton	Colton
Kumpe-Hauser Corp., Ltd., Ormand Quarry	b	Box 827, Riverside	Bly Junction
Kuster & Waterburg	a	Corona	Corona
Massey Rock & Sand Co., Fay Waller	a	Indio	Indio
City of Riverside	b	Riverside	Riverside
Rohl-Connolly Co., Ormand Quarry	b	4351 Valley Blvd., Los Angeles	Bly Junction
The Service Gravel Co., F. A. Braman	a	Box 309, Riverside	Riverside
P. J. Weisel, Industrial Sands	a, c	La Habra	Corona
Sacramento County			
Gilbert Adams	a	2611 25th St., Sacramento	Sacramento
Brighton Sand & Gravel Co.	a, b	P.O. Box 2604, Sacramento	Sacramento
Canon & Co.	c	Box 281, Sacramento	Ben Ali
Del Paso Rock & Gravel Co.	a, b	H St. Rd., Sacramento	Del Paso

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag and volcanic cinder. f. Tube-mill pebbles. g. Decomposed granite.

STONE, MISCELLANEOUS—Continued

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

Operator	Product	Address	Location of pit or quarry
Sacramento County—Continued			
Mucke Sand & Gravel Co.	a, b	1433 57th St., Sacramento	Mayhew
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Fair Oaks, Mayhow and American River
Perkins Gravel Co.	a, b	Perkins	Perkins
Robert Powell & Co.	a	Box 815, Sacramento	American River
G. W. Solomon	a	Galt	Galt
San Benito County			
Granite Rock Co.	b	Drawer M, Watsonville	Logan
San Bernardino County			
A. T. & S. F. R.R.	a	600 Kerckhoff Bldg., Los Angeles	Gale
Consolidated Rock Products Co.	a, b	2730 S. Alameda St., Los Angeles	
Johnson Fourth Street Rock Crusher	a	305 Lytle St., San Bernardino	San Bernardino
Geo. Herz & Co.	a	Base Line & Lytle Sts., San Bernardino	San Bernardino
Holiday Rock Co.	a	Upland	Upland
E. Padgett	a	Barstow	Barstow
Redlands Gravel Co.	a, b	Redlands	Redlands
Palm Springs Builders' Supply Co.	a, b	Whitewater	Palm Springs
San Bernardino Rock & Gravel Co.	a, b	Box 249, San Bernardino	San Bernardino
Southern California Edison Co., Ltd.	a	Edison Bldg., Los Angeles	Whitewater
Triangle Rock & Gravel Co.	a, b	San Bernardino	San Bernardino
A. S. Vinnell Co.	b	1100 Westminster Ave., Alhambra	Baxter
San Diego County			
Calaveras Materials Co.	b, d	Oceanside	Oceanside
Canyon Rock Co.	a, b	Box F, San Diego	San Diego
Claudell & Johnson	a	Box 246, Hillcrest Sta., San Diego	Mission Valley
Crystal Silica Co.	a, c	717 E. 61st St., Los Angeles	Oceanside
Daley Corp., Geo. Dailey	a	4430 Boundary St., San Diego	San Diego
H. G. Fenton Material Co.	a, b	13th and Imperial Ave., San Diego	San Diego
Irving P. Howard	a, b	Chollas Rd., San Diego	San Diego
Elvira M. Hubbard	c	406 W. Nutmeg St., San Diego	San Diego
Nelson & Sloan	a	Box 832, Chula Vista	Chula Vista
Oceanside Rock & Sand Co.	a	Oceanside	Oceanside
San Francisco County			
Mission Quarry Co.	b	210 Balboa Bldg., San Francisco	San Francisco

San Joaquin County			
G. W. Bianchiani	a	Sargent Road, Lodi	Lodi
D. M. Dyer	a	527 E. Lodi Ave., Lodi	Lodi
Louis F. Flockhart	a	901 S. Pleasant Ave., Lodi	Lodi
Frank B. Marks & Sons	a	Newman	Newman
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Riverbank
Elmer J. Warner	a	1103 Sycamore, Stockton	Stockton
San Luis Obispo County			
Henry Dalessi	a	San Luis Obispo	San Luis Obispo
Harold B. Roselip	a, b	615 Grand Ave., San Luis Obispo	Atascadero
San Mateo County			
Canadas Quarry, M. F. Cunha	b	Main St., Half Moon Bay	Half Moon Bay
Golden West Quarry	b	Geneva and Santos Sts., San Francisco	Colma
Holy Cross Cemetery	b	Colma	Colma
Industrial Mineral Products, J. W. Jessiman	c	230 7th St., San Francisco	South San Francisco
Market Street Railway Co., Daly's Quarry	b	58 Sutter St., San Francisco	Daly City
Shoreland Co.	----------	Pescadero	Pescadero
Santa Barbara County			
Gates Gravel Plant, Frank H. Gates	a	Santa Maria	Sisquoc
H. G. Iliff & Son	a	Santa Maria	Santa Maria
Southern Pacific R.R. Co., Ass't Chief Engineer	b	Southern Pacific Bldg., San Francisco	Arlight
Santa Clara County			
Anderson Gravel Co.	a	Mountain View	Mountain View
Carroll Gravel Pit, R. D. Carroll	a	R.F.D. 14, Box 310A, San Jose	San Jose
Henry Faber	b	Mayfield	Mayfield
Los Gatos Sand and Gravel Co.	a	Los Gatos	Los Gatos
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Coyote and Campbell
Rhodes & Robinson, Stanford Quarry	b	Box 325, Palo Alto	Palo Alto
R. Scofield Sand & Gravel Co.	a	Los Gatos	Los Gatos
Sondgroth Bros.	a	Mountain View	Mountain View
Santa Cruz County			
Henry J. Kaiser Co.	a	1522 Latham Square Bldg., Oakland	Olympia
Pacific Coast Aggregates, Inc.	a	85 2d St., San Francisco	Olympia
Pacific Limestone Products Co.	b	Santa Cruz	Santa Cruz

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag and volcanic cinder. f. Tube-mill pebbles. g. Decomposed granite.

STONE, MISCELLANEOUS—Continued

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

Operator	Product	Address	Location of pit or quarry
Shasta County			
Columbia Construction Co., Henry J. Kaiser Co.	a	Latham Square Bldg., Oakland	Cottonwood
Diestelhorst Gravel Plant, Chas. Diestelhorst	a, b	1040 Liberty St., Redding	Redding
Lassen Volcanic Nat'l Park Sup't	a, b	Mineral, via Red Bluff	Lassen Nat'l Park
City of Redding	a	Redding	Redding
Southern Pacific R.R. Co., Ass't Chief Engineer	e	Southern Pacific Bldg., San Francisco	Kennett
Siskiyou County			
James Baker	a	Klamath Falls, Ore.	
W. D. Miller Cons. Co.	a	Box 168, Klamath Falls, Ore.	Graham Siding
Southern Pacific R.R. Co., Ass't. Chief Engineer	e	Southern Pacific Bldg., San Francisco	Kegg
A. Young	b	345 N. Main St., Yreka	Yreka
Solano County			
J. M. Nelson, Cordelia Quarry	b	Cordelia	Cordelia
Sonoma County			
Basalt Rock Co.	a	8th St., Napa	Healdsburg
Grandi Co.	a	Petaluma	Petaluma
Northwest Materials Co.	a	Geyserville	Geyserville
Spaletta & Siri	a	Santa Rosa	Santa Rosa
Hein Bros. Basalt Rock Co., Mark Hein, Pres.	b	Petaluma	Petaluma
Stony Point Quarry, W. A. Wilson	b	Petaluma, Star Route	Stony Point
Stanislaus County			
Tony Francisco	a	Crows Landing	Crows Landing
A. T. & S. F. Railway Co.		560 S. Main St., Los Angeles	
Frank B. Marks & Sons	a	Newman	Newman
Oakdale Irrigation Dist.	a	Oakdale	Oakdale
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Oakdale
Putnam Sand & Gravel Co.	a	Box 486, Modesto	Modesto
J. P. Scanlon, Scanlon Gravel Pit	a	Patterson	Crows Landing
Chas. Warner	a	Modesto	Modesto
Trinity County			
Northwestern Pacific R.R. Co., Wm. N. Neff, Gen. Sup't	b	Sausalito	Island Mountain
Tulare County			
J. J. Duggan & Sons	a	Route 2, Box 120, Porterville	Porterville
O. C. Jeffers	a	1032 River Rd., Porterville	Porterville
Porterville Cement Pipe Co.	a	Box 396, Porterville	Porterville

Tuolumne County			
Beerman & Jones	b	Sonora	Soulsbyville
Ventura County			
Maceo Construction Co.	a, b	Santa Paula	Santa Paula
Montalvo Rock Co.	a	Box 188, Montalvo	Montalvo
Piru Rock Co.	a, b	Piru	Piru
Saticoy Rock Products Co.	a, b	Ventura	Saticoy-Ventura
J. S. Toler	c	1257 Poli St., Ventura	Ventura
Yolo County			
Beckwith Bros.	a	Broderick	Broderick
Leroy Kerr	a	Yolo	Yolo
Joe Schwarzgruber	a	Woodland	Woodland
George Summers	a	Woodland	Woodland
Yolo Gravel Co.	a	Box 7, Yolo	Yolo
Yuba County			
Hemstreet & Bell	a, b	501 11th St., Marysville	Marysville
Pacific Coast Aggregates, Inc.	a	85 2d St., San Francisco	Marysville
Yuba River Sand Co.	a	Marysville	Marysville

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag and volcanic cinder. f. Tube-mill pebbles. g. Decomposed granite.

STRONTIUM

Operator	Address	Location of mine
Imperial County		
Pan-Chemical Co., John A. Stevens	1396 N. Harvard St., Claremont	Fish Mts.
San Bernardino County		
Wesley N. Rowe, et al.	919 E. Valley Blvd., Rosamond	Lovic
Strontium Carbonate Mines, C. Solomin, Jr.	2457 Scott St., San Francisco	Barstow
San Diego County		
Edgco, Inc., D. A. Eschelbach	383 Brannan St., San Francisco	

SULPHUR

Operator	Address	Location of mine
Alpine County		
Calpine Corp., C. E. McDowell*	810 Title Guarantee Bldg., Los Angeles	Markleeville
Imperial County		
Vesubio Mining Corp., Louis F. Vernisak, Pres.	Calexico	Calexico
Inyo County		
Big Pine Sulphur Co., H. Cornell†	1440 N. Spring St., Los Angeles	Last Chance Mts.
Pacific Sulphur Co.	433 S. Spring St., Los Angeles	Last Chance Mts.

* Development work only in 1940.
† Sold to Pacific Sulphur Co. in Oct., 1940.

TITANIUM

Operator	Address	Location of mine
Los Angeles County		
E. I. Du Pont De Nemours & Co.* T. C. Davis	Du Pont Bldg., Room 10032, Wilmington, Del.	San Gabriel Mts.
Mrs. Harvey R. Smith	712 S. Citrus Ave., Los Angeles	Hermosa Beach

* Development only in 1940.

TUNGSTEN

Mine	Operator	Address	Location of mine
Fresno County			
Kings River	B. Bazuik	717 Voorman, Fresno	Kings River
Quigley	Geo. W. Quigley and Perry Root	Box 63, Auberry	Kings River
Garnet Dyke	Hal and Wm. Sheridan	Turlock	Kings River
Inyo County			
Pine Creek	U. S. Vanadium Corp.	30 E. 42d St., New York, N. Y.	Bishop
Rossi	Bishop Tungsten Company, A. T. Wilkerson	Bishop	Bishop
Tungsten City	El Diablo Mining Company, H. O. Johanson	Bishop	Bishop
Tungstor	Tungstor Corp., P. N. Stevens	6233 Hollywood Blvd., Los Angeles	Bishop
Mono County			
Black Rock Tungsten Mine	Tungsten Corp. of Calif.	811 W. 7th St., Los Angeles	Benton
San Bernardino			
Atolia	Atolia Mining Co.	1022 Crocker Bldg., San Francisco	Atolia
Tulare County			
Tungsten	Tungsten Mines	929 American Ave., Long Beach	Posey

ZIRCON

Operator	Address	Location of mine
Placer County		
Mark M. Butler	243 Balboa Bldg., San Francisco	Lincoln

ZINC

1940 Principal Producers

Mine	Operator	Address	Postoffice of mine
Inyo County			
	John O'Neil and Dennis McFall	Trona	Trona
Orange County			
Silverado (Blue Light)	Blue Light Silver Mines, Inc.	Fullerton	Fullerton

SMELTERS, CUSTOM MILLS, ORE AND METAL BUYERS

Reporting Purchase of California Metals (except Gold and Silver) Produced in 1940

Name	Address	Location of plant	Metals reported purchased
American Smelting & Ref. Co.	120 Broadway, New York, N. Y.	El Paso, Texas	Copper, Lead
American Smelting & Ref. Co.	120 Broadway, New York, N. Y.	Garfield, Utah	Copper, Lead
American Smelting & Ref. Co.	120 Broadway, New York, N. Y.	Hayden, Ariz.	Copper, Lead
American Smelting & Ref. Co.	120 Broadway, New York, N. Y.	Murray, Utah	Lead
American Smelting & Ref. Co.	405 Montgomery St., San Francisco	Selby, Calif.	Copper, Lead
American Smelting & Ref. Co.	120 Broadway, New York, N. Y.	Tacoma, Wash.	Copper, Lead
Baker & Co., Inc.	Newark, N. J.	Newark, N. Y.	Platinum
Bradley & Ekstrom	320 Market St., San Francisco	San Francisco	Chromite
Coast Chemical Division F. W. Berk & Co., Inc.	Sharon Bldg., San Francisco	San Francisco	Quicksilver
Colorado Fuel & Iron Co.	Pueblo, Colo.	Pueblo, Colo.	Manganese
Columbia Steel Co.	Russ Bldg., San Francisco	Pittsburg, Calif. and Provo, Utah	Chromite and Manganese
Coast Chemical Distributors, V. R. Ghensberg	403 Sharon Bldg., San Francisco	San Francisco	Quicksilver
International Smelting & Ref. Co.	Tooele, Utah	Tooele, Utah	Copper
Magna Copper Co.	Superior, Ariz.	Superior, Ariz.	Copper
Medford Chemical Co.	1026 Santa Fe, Los Angeles	Los Angeles	Quicksilver
Menardi Metals Co.	631 S. Inglewood-Redondo Road, El Segundo	El Segundo	Antimony
Quicksilver Producers Ass'n, Irving Ballard, Sec'y	407 Sansome St., San Francisco	San Francisco	Quicksilver
Pacific Vegetable Oil Co., Bernard T. Rocca	62 Townsend St., San Francisco	San Francisco	Quicksilver
U. S. Smelting, Refining & Mining Co.	Newhouse Bldg., Salt Lake City, Utah	Midvale, Utah	Copper, Lead, Zinc
Western Gold & Platinum Works	589 Bryant St., San Francisco	San Francisco	Platinum
Wildberg Bros. Smelting & Ref. Co.	742 Market St., San Francisco	San Francisco	Platinum

APPENDIX

PUBLIC RESOURCES CODE

An act to establish a Public Resources Code, thereby consolidating and revising the law relating to natural resources, the conservation, utilization, and supervision thereof, and matters incidental thereto, and to repeal certain acts and parts of acts specified herein.

Chapter 93 (Stats. 1939.)

The people of the State of California do enact as follows:

GENERAL PROVISIONS

1. This act shall be known as the Public Resources Code.

2. The provisions of this code, in so far as they are substantially the same as existing provisions relating to the same subject matter shall be construed as restatements and continuations thereof and not as new enactments.

3. All persons who, at the time this code goes into effect, hold office under any of the acts repealed by this code, which offices are continued by this code, continue to hold the same according to the former tenure thereof.

4. No action or proceeding commenced before this code takes effect, and no right accrued, is affected by the provisions of this code, but all procedure thereafter taken therein shall conform to the provisions of this code so far as possible.

5. Unless the context otherwise requires, the general provisions hereinafter set forth shall govern the construction of this code.

6. Division, part, chapter, article, and section headings contained herein shall not be deemed to govern, limit, modify or in any manner affect the scope, meaning, or intent of the provisions of any division, part, chapter, article, or section hereof.

7. Whenever, by the provisions of this code, an administrative power is granted to a public officer or a duty imposed upon such officer, the power may be exercised or the duty performed by a deputy of the officer or by a person authorized pursuant to law.

8. Writing includes any form of recorded message capable of comprehension by ordinary visual means. Whenever any notice, report, statement or record is required by this code, it shall be made in writing in the English language.

9. Whenever any reference is made to any portion of this code or of any other law of this State, such reference shall apply to all amendments and additions thereto now or hereafter made.

10. "Section" means a section of this code unless some other statute is specifically mentioned.

11. The present tense includes the past and future tenses; and the future the present.

12. The masculine gender includes the feminine and neuter.

13. The singular number includes the plural, and the plural the singular.

14. "County" includes "city and county."

15. "Shall" is mandatory and "may" is permissive.

16. "Oath" includes affirmation.

17. "Signature" or "subscription" includes mark when the signer or subscriber can not write, such signer's or subscriber's name being written near the mark by a witness who writes his own name near the signer's or subscriber's name; but a signature or subscription by mark can be acknowledged or can serve as a signature or subscription to a sworn statement only when two witnesses so sign their own names thereto.

18. If any provision of this code, or the application thereof to any person or circumstances, is held invalid the remainder of the code, and the application of its provisions to the other persons or circumstances, shall not be affected thereby.

DIVISION 1. THE DEPARTMENT OF NATURAL RESOURCES

501. There is in the State government a Department of Natural Resources. The department shall be conducted under the control of an executive officer known as the Director of Natural Resources. The director shall be appointed by and hold office at the pleasure of the Governor and shall receive a salary of six thousand dollars a year.

502. Except as in this division otherwise provided, the provisions of Article 2, Chapter 3, Title 1, Part 3 of the Political Code shall govern and apply to the conduct of the Department of Natural Resources in every respect the same as if such provisions were herein set forth at length, and wherever in that article the term "head of the department" or similar designation occurs, it shall for the purposes of this division mean the Director of Natural Resources.

503. For the purposes of administration the department shall be organized by the director, subject to the approval of the Governor, in such manner as he deems necessary properly to segregate and conduct the work of the department. The director may appoint, in accordance with the civil service and other provisions of law, such deputies, officers, and other expert and clerical assistants as may be necessary.

504. The work of the department shall be divided into at least four divisions, known as Division of Forestry, the Division of Parks, The Division of Fish and Game, and The Division of Mines.

505. The Division of Forestry shall be administered through a chief who shall be known as the State Forester. He shall be a technically trained forester, appointed by the director upon nomination by the State Board of Forestry. General policies for the guidance of the Division of Forestry shall be determined by a State Board of Forestry which shall consist of seven members appointed by and holding office at the pleasure of the Governor. Of the seven members one shall be familiar with the pine timber industry, one with the redwood industry, one with live stock industry, one with general agriculture, and one with the problems of water conservation.

506. The Division of Parks shall be administered through a chief who shall be appointed by the director upon nomination by the State Park Commission. General policies for the administration of the State park system shall be determined by the State Park Commission which shall consist of five members appointed by and holding office at the pleasure of the Governor.

507. The Division of Mines shall be administered through a chief who shall be known as the State Mineralogist. He shall be a technically trained mining engineer, appointed by the director upon nomination by the State Mining Board. General policies for the guidance of the Division of Mines shall be determined by a State Mining Board, which shall consist of five members appointed by and holding office at the pleasure of the Governor.

508. The Division of the Department of Natural Resources for the supervision of oil and gas shall be in charge of a chief, known as the State Oil and Gas Supervisor.

509. The salaries of the chiefs of the Divisions of Forestry and Parks shall be fixed by the director with the approval of the Governor. The director and the chief of each division, before entering upon his duties, shall execute and deliver to the State an official bond in the sum of twenty-five thousand dollars conditioned upon the faithful performance of his duties.

510. The members of the Board of Forestry and the State Park Commission shall serve without compensation, but shall be entitled to their actual necessary expenses incurred in the performance of their duties.

512. The Department of Natural Resources may expend the money in any appropriation or in any special fund in the State treasury made available by law for the administration of the statutes the administration of which is committed to the department, or for the use, support, or maintenance of any board, bureau, commission, department, office, or officer whose duties, powers, and functions have been transferred to and conferred upon the department. Such expenditures by the department shall be made in accordance with law in carrying out the purposes for which the appropriations were made or the special funds created.

513. The department shall have possession and control of all records, books, papers, offices, equipment, supplies, moneys, funds, appropriations, land and other

property, real or personal held for the benefit or use of all bodies, offices, and officers whose duties, powers, and functions have been transferred to and conferred upon the department.

514. Nothing in this code is intended to supersede, modify or change the effect of the enactment of section 373g of the Political Code, and wherever in this code reference is made to any officer or agency of the Department of Natural Resources, it is made in the sense and with the same legal effect as was attributable thereto in the statute whence derived and which would continue to be so attributable but for the adoption of this code.

DIVISION 2. MINES AND MINING

Chapter 1. Definitions

2001. Unless the context otherwise requires, the definitions hereinafter set forth shall govern the construction of Division 2 of this code.

2002. "Department" in reference to the government of this State, means the Department of Natural Resources.

2003. "Division" in reference to the government of this State, means the Division of Mines in the Department of Natural Resources.

2004. "Person" includes any individual, firm, association, corporation, or any other group or combination acting as a unit.

Chapter 2. The Division of Mines

2200. For the purposes of this chapter "mine" includes all mineral bearing properties of whatever kind or character, whether underground, quarry, pit, well, spring or other source from which any mineral substance is or may be obtained. "Mineral" for the purposes of this chapter includes all mineral products both metallic and nonmetallic, solid, liquid or gaseous, and mineral waters of whatever kind or character.

2201. The State Mineralogist shall employ competent geologists, field assistants, qualified specialists, and office employees when necessary in the execution of the plans and operations of the division under this chapter and shall fix their compensation.

2202. The State Mineralogist shall maintain offices, and a museum, library, and laboratory in San Francisco for the purposes provided in this chapter.

2203. The State Mineralogist shall make a biennial report to the Governor on or before the fifteenth day of September next preceding the regular session of the Legislature.

2204. The State Mineralogist may receive on behalf of this State, for the use and benefit of the division, gifts, bequests, devices, and legacies of real or other property and may use the same in accordance with the wishes of the donors. If no instructions are given by the donors, the State Mineralogist shall manage, use, and dispose of the gifts, bequests, and legacies for the best interests of the division and in such manner as he may deem proper.

2205. The State Mineralogist shall:

(a) Make, facilitate, and encourage special studies of the mineral resources and mineral industries of the State.

(b) Collect statistics concerning the occurrence and production of the economically important minerals and the methods pursued in making their valuable constituents available for commercial use.

(c) Make a collection of typical geological and mineralogical specimens, especially those of economic and commercial importance such collection constituting the museum of the division.

(d) Provide a library of books, reports, and drawings bearing upon the mineral industries, the sciences of mineralogy and geology, and the arts of mining and metallurgy, such library constituting the library of the division.

(e) Make a collection of models, drawings, and descriptions of the mechanical appliances used in mining and metallurgical processes.

(f) Preserve and so maintain such collections and library as to make them available for reference and examination, and open to public inspection at reasonable hours.

(g) Maintain, in effect, a bureau of information concerning the mineral industry of this State to consist of such collections and library, and arrange, classify, catalogue, and index the data therein contained, in a manner to make the information available to those desiring it.

(h) Issue from time to time such bulletins as he may deem advisable concerning the statistics and technology of the mineral industries of this State.

2206. The State Mineralogist may prepare a special collection of ores and minerals of California to be sent to or used at any world's fair or exposition in order to display the mineral wealth of the State.

2207. The owner, lessor, lessee, agent, manager, or other person in charge of any mine of whatever kind or character within the State shall forward to the State Mineralogist, upon his request, at his office, not later than the thirty-first day of March in each year, a detailed report upon forms which will be furnished showing the character of the mine, the number of men employed, the method of working the mine and the general condition thereof, and the total mineral production for the past year. He shall also furnish any additional information relative to such mine that the State Mineralogist may from time to time require for the proper discharge of his official duties. Any such person who fails to comply with the provisions of this section is guilty of a misdemeanor.*

2208. The State Mineralogist or a qualified assistant may at any time enter or examine any and all mines, quarries, wells, mills, reduction works, refining works, and other mineral properties or working plants in this State in order to gather data to comply with the provisions of this chapter.

2209. The State Mineralogist may fix a price upon and dispose of to the public all publications of the division, including reports, bulletins, maps, registers, or other publications. The price shall approximate the cost of publication and distribution. He may also furnish the publications of the division to public libraries without cost and may exchange publications with geological surveys, scientific societies, and other like bodies.

2210. All money received by the division from sales of publications issued by the division shall be deposited at least once each month in the State treasury to the credit of the Division of Mines revolving printing fund, which fund is continued in existence. This fund is appropriated for the use of the division, in addition to such other funds as may be appropriated, for the printing and publishing of reports, bulletins, and maps issued by the division. The State Controller may require financial reports from the division or any officer thereof.

(Added by Stats. 1939, Ch. 96, as part of codification.)

---

* Sec. 19 of the Penal Code of California provides: "Except in cases where a different punishment is prescribed by this code, every offense declared to be a misdemeanor is punishable by imprisonment in a county jail not exceeding six months, or by a fine not exceeding five hundred dollars, or by both."

PUBLICATIONS OF THE DIVISION OF MINES

During the past sixty-one years, in carrying out the provisions of the organic act creating the former California State Mining Bureau, there have been published many reports, bulletins and maps which go to make up a library of detailed information on the mineral industry of the State, a large part of which could not be duplicated from any other source.

One feature that has added to the popularity of the publications is that many of them have been distributed without cost to the public, and even the more elaborate ones have been sold at a price which barely covers the cost of printing.

Owing to the fact that funds for the advancing of the work of this department have usually been limited, the reports and bulletins mentioned are printed in limited editions many of which are now entirely exhausted.

Copies of such publications are available for reference, however, in the offices of the Division of Mines, in the Ferry Building, San Francisco; State Building, Los Angeles; State Office Building, Sacramento; Redding; and Division of Oil and Gas at Santa Barbara, Santa Paula, Taft, Bakersfield, Coalinga. They may also be found in many public, private and technical libraries in California and other states and foreign countries.

A catalog of all publications from 1880 to 1917, giving a synopsis of their contents, is issued as Bulletin No. 77.

Publications in stock may be obtained postpaid by addressing the San Francisco, Los Angeles or Sacramento offices and enclosing the requisite amount.

Remittances of stamps in an amount not to exceed 26 cents, currency or coin will be accepted at sender's risk. Payment is preferred in the form of money orders.

Money orders should be made payable to the Division of Mines.

NOTE.—The Division of Mines frequently receives requests for some of the early Reports and Bulletins now out of print, and it will be appreciated if parties having such publications and wishing to dispose of them will advise this office.

Write for latest revised price list.

REPORTS

Asterisks (**) indicate the publication is out of print.

	Price (including postage and sales tax)
**First Annual Report of the State Mineralogist, 1880, 43 pp. Henry G. Hanks	----
**Second Annual Report of the State Mineralogist, 1882, 514 pp., 4 illustrations, 1 map. Henry G. Hanks	----
**Third Annual Report of the State Mineralogist, 1883, 111 pp., 21 illustrations. Henry G. Hanks	----
**Fourth Annual Report of the State Mineralogist, 1884, 410 pp., 7 illustrations. Henry G. Hanks	----
**Fifth Annual Report of the State Mineralogist, 1885, 234 pp., 15 illustrations, 1 geological map. Henry G. Hanks	----
Sixth Annual Report of the State Mineralogist, Part I, 1886, 145 pp., 3 illustrations, 1 map. Henry G. Hanks--Price $0.75, sales tax $0.02	$0.77
Part II, 1887, 222 pp., 36 illustrations. William Irelan, Jr.---- Price $0.75, sales tax $0.02	.77
**Seventh Annual Report of the State Mineralogist, 1887, 315 pp. William Irelan, Jr.	----
**Eighth Annual Report of the State Mineralogist, 1888, 948 pp., 122 illustrations. William Irelan, Jr.	----
**Ninth Annual Report of the State Mineralogist, 1889, 352 pp., 57 illustrations, 2 maps. William Irelan, Jr.	----
**Tenth Annual Report of the State Mineralogist, 1890, 983 pp., 179 illustrations, 10 maps. William Irelan, Jr.	----
Eleventh Report (First Biennial) of the State Mineralogist, for the two years ending September 15, 1892, 612 pp., 73 illustrations, 4 maps. William Irelan, Jr.--Price $1.50, sales tax $0.05	1.55
**Twelfth Report (Second Biennial) of the State Mineralogist, for the two years ending September 15, 1894, 541 pp., 101 illustrations, 5 maps. J. J. Crawford	----
**Thirteenth Report (Third Biennial) of the State Mineralogist, for the two years ending September 15, 1896, 726 pp., 93 illustrations, 1 map. J. J. Crawford	----
Chapters of the State Mineralogist's Report, XIV Biennial Period, 1913-1914, Fletcher Hamilton:	
**Mines and Mineral Resources, Amador, Calaveras and Tuolumne Counties, 172 pp., paper	----
Mines and Mineral Resources, Colusa, Glenn, Lake, Marin, Napa, Solano, Sonoma and Yolo Counties, 208 pp., paper---- Price $0.75, sales tax $0.02	.77
**Mines and Mineral Resources, Del Norte, Humboldt and Mendocino Counties, 59 pp., paper	----
**Mines and Mineral Resources, Fresno, Kern, Kings, Madera, Mariposa, Merced, San Joaquin and Stanislaus Counties, 220 pp., paper	----
**Mines and Mineral Resources of Imperial and San Diego Counties, 113 pp., paper	----
**Mines and Mineral Resources, Shasta, Siskiyou and Trinity Counties, 180 pp., paper	----
**Fourteenth Report of the State Mineralogist, for the Biennial Period 1913-1914, Fletcher Hamilton, 1915: A General Report on the Mines and Mineral Resources of Amador, Calaveras, Tuolumne, Colusa, Glenn, Lake, Marin, Napa, Solano, Sonoma, Yolo, Del Norte, Humboldt, Mendocino, Fresno, Kern, Kings, Madera, Mariposa, Merced, San Joaquin, Stanislaus, San Diego, Imperial, Shasta, Siskiyou and Trinity Counties, 974 pp., 275 illustrations, cloth	----
Chapters of the State Mineralogist's Report, XV Biennial Period, 1915-1916, Fletcher Hamilton:	
**Mines and Mineral Resources, Alpine, Inyo and Mono Counties, 176 pp., paper	----
Mines and Mineral Resources, Butte, Lassen, Modoc, Sutter and Tehama Counties, 91 pp., paper--Price $0.75, sales tax $0.02	.77

REPORTS—Continued

Asterisks (**) indicate the publication is out of print.	Price (Including postage and sales tax)
Mines and Mineral Resources, El Dorado, Placer, Sacramento and Yuba Counties, 198 pp., paper——Price $0.75, sales tax $0.02	$0.77
Mines and Mineral Resources, Monterey, San Benito, San Luis Obispo, Santa Barbara and Ventura Counties, 183 pp., paper——Price $0.75, sales tax $0.02	.77
**Mines and Mineral Resources, Los Angeles, Orange and Riverside Counties, 136 pp., paper——	----
**Mines and Mineral Resources, San Bernardino and Tulare Counties, 186 pp., paper ——	----
**Fifteenth Report of the State Mineralogist, for the Biennial Period 1915-1916, Fletcher Hamilton, 1917: A General Report on the Mines and Mineral Resources of Alpine, Inyo, Mono, Butte, Lassen, Modoc, Sutter, Tehama, Placer, Sacramento, Yuba, Los Angeles, Orange, Riverside, San Benito, San Luis Obispo, Santa Barbara, Ventura, San Bernardino and Tulare Counties, 990 pp., 413 illustrations, cloth——	----
Chapters of the State Mineralogist's Report XVI, Biennial Period, 1917-1918, Fletcher Hamilton:	
Mines and Mineral Resources of Nevada County, 270 pp., paper——Price $1.00, sales tax $0.03	1.03
Mines and Mineral Resources of Plumas County, 188 pp., paper——Price $0.75, sales tax $0.02	.77
Mines and Mineral Resources of Sierra County, 144 pp., paper——Price $0.75, sales tax $0.02	.77
Seventeenth Report of the State Mineralogist, 1920, 'Mining in California during 1920,' Fletcher Hamilton; 562 pp., 71 illustrations, cloth——Price $2.50, sales tax $0.08	2.58
Eighteenth Report of the State Mineralogist, 1922, 'Mining in California,' Fletcher Hamilton. Chapters published monthly beginning with January, 1922:	
**January, **February, **March, **April, May, June, July, August, September, October, November, December, 1922——Price $0.40, sales tax $0.01	.41
Chapters of Nineteenth Report of the State Mineralogist, 'Mining in California,' Fletcher Hamilton and Lloyd L. Root. January, February, March, September, 1923——Price $0.40, sales tax $0.01	.41
Chapters of Twentieth Report of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly. January, April, July, October, 1924, per copy——Price $0.40, sales tax $0.01	.41
Chapters of Twenty-first Report of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:	
January, 1925, Mines and Mineral Resources of Sacramento, Monterey and Orange Counties——Price $0.40, sales tax $0.01	.41
April, 1925, Mines and Mineral Resources of Calaveras, Merced, San Joaquin, Stanislaus and Ventura Counties——Price $0.40, sales tax $0.01	.41
**July, 1925, Mines and Mineral Resources of Del Norte, Humboldt and San Diego Counties——	----
**October, 1925, Mines and Mineral Resources of Siskiyou, San Luis Obispo and Santa Barbara Counties——	----
Chapters of Twenty-second Report of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:	
**January, 1926, Mines and Mineral Resources of Trinity and Santa Cruz Counties ——	----
April, 1926, Mines and Mineral Resources of Shasta, San Benito and Imperial Counties ——Price $0.40, sales tax $0.01	.41
July, 1926, Mines and Mineral Resources of Marin and Sonoma Counties——Price $0.40, sales tax $0.01	.41
**October, 1926, Mines and Mineral Resources of El Dorado and Inyo Counties, also report on Minaret District, Madera County——	----

REPORTS—Continued

Asterisks (**) indicate the publication is out of print. Price (including postage and sales tax)

Chapters of Twenty-third Report of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:

January, 1927, Mines and Mineral Resources of Contra Costa County; Santa Catalina Island——Price $0.40, sales tax $0.01 $0.41

April, 1927, Mines and Mineral Resources of Amador and Solano Counties Price $0.40, sales tax $0.01 .41

**July, 1927, Mines and Mineral Resources of Placer and Los Angeles Counties —— --

October, 1927, Mines and Mineral Resources of Mono County—— Price $0.40, sales tax $0.01 .41

Chapters of Twenty-fourth Report of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:

January, 1928, Mines and Mineral Resources of Tuolumne County—— Price $0.40, sales tax $0.01 .41

April, 1928, Mines and Mineral Resources of Mariposa County—— Price $0.40, sales tax $0.01 .41

**July, 1928, Mines and Mineral Resources of Butte and Tehama Counties ——

October, 1928, Mines and Mineral Resources of Plumas and Madera Counties ——Price $0.40, sales tax $0.01 .41

Chapters of Twenty-fifth Report of the State Mineralogist, 'Mining in California,' Walter W. Bradley. Published quarterly:

**January, 1929, Mines and Mineral Resources of Lassen, Modoc and Kern Counties; also on Special Placer Machines—— ——

**April, 1929, Mines and Mineral Resources of Sierra, Napa, San Francisco and San Mateo Counties—— ——

July, 1929, Mines and Mineral Resources of Colusa, Fresno and Lake Counties ——Price $0.40, sales tax $0.01 .41

October, 1929, Mines and Mineral Resources of Glenn, Alameda, Mendocino and Riverside Counties——Price $0.40, sales tax $0.01 .41

Chapters of Twenty-sixth Report of the State Mineralogist, 'Mining in California,' Walter W. Bradley. Published quarterly:

January, 1930, Mines and Mineral Resources of Santa Clara County; also Barite in California——Price $0.40, sales tax $0.01 .41

**April, 1930, Mines and Mineral Resources of Nevada County; also Mineral Paint Materials in California—— ——

**July, 1930, Mines and Mineral Resources of Yuba and San Bernardino Counties; also Commercial Grinding Plants in California—— ——

October, 1930, Mines and Mineral Resources of Butte, Kings and Tulare Counties; also Geology of Southwestern Mono County (Preliminary) Price $0.40, sales tax $0.01 .41

Chapters of Twenty-seventh Report of the State Mineralogist, 'Mining in California,' Walter W. Bradley. Published quarterly:

January, 1931. Preliminary Report of Economic Geology of the Shasta Quadrangle. Beryllium and Beryl. The New Tariff and Nonmetallic Products. Crystalline Talc. Decorative Effects in Concrete—— Price $0.40, sales tax $0.01 .41

April, 1931, Stratigraphy of the Kreyenhagen Shale. Diatoms and Silicoflagellates of the Kreyenhagen Shale. Foraminifera of the Kreyenhagen Shale. Geology of Santa Cruz Island—— Price $0.40, sales tax $0.01 .41

**July, 1931. (Yuba, San Bernardino.) Feldspar, Silica, Andalusite and Cyanite Deposits of California. Note on a Deposit of Andalusite in Mono County; its occurrence and chemical importance. Bill creating Trinity and Klamath River Fish and Game District and its effect upon mining —— ——

October, 1931. (Alpine.) Geology of the San Jacinto Quadrangle south of San Gorgonio Pass, California. Notes on Mining Activities in Inyo and Mono Counties in July, 1931—Price $0.40, sales tax $0.01 .41

Chapters of Twenty-eighth Report of the State Mineralogist, 'Mining in California,' Walter W. Bradley. Published quarterly:

REPORTS—Continued

Asterisks (**) indicate the publication is out of print.	Price (including postage and sales tax)
January, 1932, Economic Mineral Deposits of the San Jacinto Quadrangle. Geology and Physical Properties of Building Stone from Carmel Valley. Contributions to the Study of Sediments. Sediments of Monterey Bay. Sanbornite_____Price $0.40, sales tax $0.01	$0.41
**April, 1932. Elementary Placer Mining Methods and Gold Saving Devices. The Pan, Rocker and Sluice Box. Prospecting for Vein Deposits. Bibliography of Placer Mining_____	----
Abstract from April quarterly: Elementary Placer Mining Methods and Gold Saving Devices. Types of Deposits, Simple Equipment. Special Machines. Dry Washing. Black Sand Treatment. Marketing of Products. Placer Mining Areas. Laws. Prospecting for Quartz Veins. Bibliography (mimeographed)_____Free, postage $0.05	.05
**July-October. (Ventura.) Report accompanying Geologic Map of Northern Sierra Nevada. Fossil Plants in Auriferous Gravels of the Sierra Nevada. Glacial and Associated Stream Deposits of the Sierra Nevada. Jurassic and Cretaceous Divisions in the Knoxville-Shasta Succession of California. Geology of a part of the Panamint Range. Economic Report of a Part of the Panamint Range. Acquiring Mining Claims Through Tax Title. The Biennial Report of State Mineralogist _____	----
Chapters of Report XXIX, 1933 (quarterly): titled 'California Journal of Mines and Geology,' containing the following:	
January-April. Gold Deposits of the Redding and Weaverville Quadrangles. Geologic Formations of the Redding-Weaverville District, Northern California. Geology of Portions of Del Norte and Siskiyou Counties. Applications of Geology to Civil Engineering. The Lakes of California. Discovery of Piedmontite in the Sierra Nevada. Tracing 'Buried River' Channel Deposits by Geomagnetic Methods. Geologic Map of Redding-Weaverville District, showing gold mines and prospects. Geologic map showing various mines and prospects of part of Del Norte and Siskiyou Counties_____ Price $1.00, sales tax $0.03	1.03
July-October. Gold Resources of Kern County. Limestone Deposits of the San Francisco Region. Limestone Weathering and Plant Associations of the San Francisco Region. Booming, Death Valley National Monument, California. Placer Mining Districts, Senate Bill 480. Navigable Waters, Assembly Bill 1543_____ Price $1.00, sales tax $0.03	1.03
Chapters of Report XXX, 1934 (quarterly): titled 'California Journal of Mines and Geology,' containing the following:	
January. Resurrection of Early Surfaces in the Sierra Nevada. Geology and Mineral Resources of Northeastern Madera County. Geology and Mineral Deposits of Laurel and Convict Basins, Southwestern Mono County. Notes on Sampling as Applied to Gold Quartz Deposits___ Price $0.60, sales tax $0.02	.62
April-July. Elementary Placer Mining in California and Notes on the Milling of Gold Ores_____Price $1.00, sales tax $0.03	1.03
October. Current Mining Developments in Northern California. Current Mining Activity in Southern California. Geology and Mineral Resources of the Julian District, San Diego County. Geology and Mineral Resources of Elizabeth Lake Quadrangle. Dry Placers of Northern Mojave Desert. Biennial Report of State Mineralogist. Assessment Work Within Withdrawn Areas_____ Price $0.60, sales tax $0.02	.62
Chapters of Report XXI, 1935 (quarterly): titled 'California Journal of Mines and Geology,' containing the following:	
January. Review of Gold Mining in East-Central, 1934. Current Mining Activities in the San Francisco District with Special Reference to Gold. Geological Investigation of the Clays of Riverside and Orange Counties, Southern California. Information regarding Mining Loans by the Reconstruction Finance Corporation_____ Price $0.60, sales tax $0.02	.62

REPORTS—Continued

Asterisks (**) indicate the publication is out of print.

Price (including postage and sales tax)

April. A Geologic Section Across the Southern Peninsular Range of California. New Technique Applicable to the Study of Placers. Grubstake Permits ——————Price $0.60, sales tax $0.02 $0.62

July. Mines and Mineral Resources of Siskiyou County (with map). Dams for Hydraulic Mining Debris. Leasing System as Applied to Metal Mining. Mine Financing in California. New Laws Make Radical Change in Mining Rights——Price $0.60, sales tax $0.02 .62

October. Mines and Mineral Resources of San Luis Obispo County. Mineral Resources of Portions of Monterey and Kings Counties. Mining Activity at Soledad Mountain and Middle Buttes—Mojave District, Kern County. Geology of a Portion of the Perris Block, Southern California. Mineral Resources of a Portion of the Perris Block, Riverside County ——————Price $0.60, sales tax $0.02 .62

Chapters of Report XXXII, 1936 (quarterly): titled 'California Journal of Mines and Geology,' containing the following:

January. Gold Mines of Placer County, including Drag-line Dredges. Geologic Report on Borax Lake, California——————
Price $0.60, sales tax $0.02 .62

April. Geology, Mining and Processing of Diatomite at Lompoc, Santa Barbara County. Essentials in Developing and Financing a Prospect into a Mine. Gold-bearing Veins of Meadow Lake District, Nevada County. Semi-Precious Gem Stone Collection in Division Museum——
Price $0.60, sales tax $0.02 .62

July. Mines and Mineral Resources of Calaveras County. Mining in California by Power Shovel. Assessment Work on Mining Claims Within Withdrawn Areas. Joshua Tree National Monument. Cost of Producing Quicksilver at a California Mine in 1931-1932. The Age of Mineral Utilization——————Price $0.60, sales tax $0.02 .62

October. Mineral Resources of Lassen and Modoc Counties. Mechanics of Lone Mountain Landslides, San Francisco. Biennial Report of the State Mineralogist, Properties and Industrial Applications of Opaline Silica ——————Price $0.60, sales tax $0.02 .62

Chapters of Report XXXIII, 1937 (quarterly): titled 'California Journal of Mines and Geology,' containing the following:

January. Source Data of the Geologic Map of California, January, 1937. The Geology of Quicksilver Ore Deposits. Prospecting for Lode Gold ——————Price $0.60, sales tax $0.02 .62

April. Mineral Resources of Plumas County (with Geologic Map). List of preferred mineral names. New Placer Mining Debris Law
Price $0.60, sales tax $0.02 .62

July. Mineral Resources of Los Angeles County (with map showing principal Mines and Oil Fields.) Geology and mineral deposits of the Western San Gabriel Mountains, Los Angeles County——————
Price $0.60, sales tax $0.02 .62

October. Mineral Resources of the Resting Springs Region, Inyo County. Paleozoic Section in the Nopah and Resting Springs Mountains, Inyo County, California. Native Arsenic from Grass Valley, California——
Price $0.60, sales tax $0.02 .62

Chapters of Report XXXIV, 1938 (quarterly): titled 'California Journal of Mines and Geology,' containing the following:

January. Mineral Development and Mining Activity in Southern California during the year 1937. Doing Something About Earthquakes. Gold and Petroleum in California. Gem Minerals of California, Lapidary Art ——————Price $0.60, sales tax $0.02 .62

April. Gold dredging in Shasta, Siskiyou and Trinity Counties; Geology of the Central Santa Monica Mountains; Marketing Mica——————
Price $0.60, sales tax $0.02 .62

July, El Dorado County, Mineral High-Lights of California; Strategic Minerals of California; Cyanide Treatment of Gossan at Mountain Copper Co.; Submarine Canyons off the California Coast——————
Price $0.60, sales tax $0.02 .62

REPORTS—Continued

Asterisks (**) indicate the publication is out of print.

Price (including postage and sales tax)

October, Inyo County, Biennial Report of State Mineralogist, Sulphur Deposits of Inyo County, Geology of the Darwin Silver-Lead Mining District ——— Price $0.60, sales tax $0.02 $0.62

Chapters of Report XXXV, 1939 (quarterly) titled "California Journal of Mines and Geology," containing the following:

January, San Diego County, Geology and Oil Possibilities of Southwestern San Diego Co.; Prospect for 'Minor Metals' and Nonmetallic Minerals; The Right to Mine——— Price $0.60, sales tax $0.02 .62

April, Shasta County, Public's Interest in Mine Taxation——— Price $0.60, sales tax $0.02 .62

July, Tertiary Formations of Northern Sacramento Valley, California; Geology and Oil Possibilities of Caliente Range, Cuyama Valley and Carrizo Plain, California; Bibliography of the Geology and Mineral Resources of California for the year 1937; The Giant Goose Lake Meteorite from Modoc County, California—Price $0.60, sales tax $0.02 .62

October, Quicksilver Resources of California; Sulphate Minerals of the Leviathan Sulphur Mine, Alpine County, California——— Price $0.60, sales tax $0.02 .62

Chapters of Report XXXVI, 1940 (quarterly) titled "California Journal of Mines and Geology," containing the following:

January Current Mining Activity in Southern California; Notes on Beryl with a Qualitative Analysis for Beryllium; Strategic Minerals Investigations Procedure followed by the U. S. Bureau of Mines——— Price $0.60, sales tax $0.02 .62

April, Mineral Resources of Mono County; General Geology and Ores of the Blind Spring Hill Mining District, Mono County, California; Short Report on the Geological Formations Encountered in Driving the Mono Craters Tunnel; Methods and Costs of Mining and Concentrating Chromite ——— Price $0.60, sales tax $0.02 .62

July, Economic Mineral Deposits of the Newberry and Ord Mountains, San Bernardino County; Geology of the Newberry and Ord Mountains, San Bernardino County, California; Notes on the Geology of a Portion of the Calico Mountains, San Bernardino County, California; Study of Chrome Process Aided by Martin Dennis Company Price $0.60, sales tax $0.02 .62

October, Mineral Resources of the Kernville Quadrangle; Strategic Problems of the Mineral Industry in California; Descriptive Geology of the Kernville Quadrangle, California; Biennial Report of the State Mineralogist; Strategic Tax Exemption; Federal Loans for Strategic Minerals——— Price $0.60, sales tax $0.02 .62

Chapters of Report XXXVII, 1941 (quarterly) titled "California Journal of Mines and Geology," containing the following:

January, Mineral Resources of Trinity County; Strategic Minerals Procurement; Geologic Investigation of the Chromite Deposits of California; United States Supreme Court Renders Far-reaching Decision on Power Permits on "Navigable" Streams; Securities and Exchange Commission——— Price $0.60, sales tax $0.02 .62

Subscription, $2.00 postpaid in advance (by calendar year only).

Chapters of State Oil and Gas Supervisor's Report:

Summary of Operations—California Oil Fields, July, 1918, to March, 1919 (one volume)——— Free

Summary of Operations—California Oil Fields. Published monthly, beginning April, 1919:

**April, **May, **June, **July, **August, **September, **October, **November, **December, 1919——— ----

**January, **February, **March, **April, **May, **June, **July, **August, **September, **October, **November, **December, 1920——— ----

January, **February, **March, April, **May, **June, **July, August, **September, **October, **November, **December, 1921——— Free

January, February, March, April, May, June, **July, **August, September, **October, **November, December, 1922——— Free

REPORTS—Continued

Asterisks (**) indicate the publication is out of print. Price (including postage and sales tax)

January, February, **March, **April, May, **June, **July, August, September, **October, November, **December, 1923	Free
January, February, March, April, May, June, **July, August, September, October, November, December, 1924	Free
January, February, March, April, May, June, July, August, September, October, November, December, 1925	Free
January, February, March, April, May, June, July, August, September, October, November, December, 1926	Free
January, February, March, April, May, June, July, August, September, October, November, December, 1927	Free
January, February, March, April, **May, June, July, August, September, October, **November, **December, 1928	Free
January, February, March, April, May, June, July-August-September, October-November-December, 1929 (Published quarterly beginning July, 1929)	Free
January-February-March, April-May-June, July-August-September, October-November-December, 1930	Free
January-February-March, April-May-June, July-August-September, 1931	Free
January, February, March, April, May, June, July, August, September, October, November, December, 1932	Free
January, February, March, 1933	Free
April, May, June, 1933	Free
July, August, September, 1933	Free
October-November-December, 1933	Free
January-February-March, 1934	Free
April-May-June, 1934	Free
July-August-September, 1934	Free
October-November-December, 1934	Free
January-February-March, 1935	Free
April-May-June, 1935	Free

BULLETINS

**Bulletin No. 1. Description of Some Desiccated Human Remains, by Winslow Anderson. 1888, 41 pp., 6 illustrations	----
**Bulletin No. 2. Methods of Mine Timbering, by W. H. Storms. 1894, 58 pp., 75 illustrations	----
**Bulletin No. 3. Gas and Petroleum Yielding Formations of Central Valley of California, by W. L. Watts. 1894, 100 pp., 13 illustrations, 4 maps	----
**Bulletin No. 4. Catalogue of California Fossils, by J. G. Cooper, 1894, 73 pp., 67 illustrations. (Part I was published in the Seventh Annual Report of the State Mineralogist, 1887)	----
**Bulletin No. 5. The Cyanide Process, 1894, by Dr. A. Scheidel. 140 pp., 46 illustrations	----
**Bulletin No. 6. California Gold Mill Practices, 1895, by E. B. Preston, 85 pp., 46 illustrations	----
**Bulletin No. 7. Mineral Production of California, by Counties, for the year 1894, by Charles G. Yale. Tabulated sheet	----
**Bulletin No. 8. Mineral Production of California, by Counties, for the year 1895, by Charles G. Yale. Tabulated sheet	----
**Bulletin No. 9. Mine Drainage, Pumps, etc., by Hans C. Behr. 1896, 210 pp., 206 illustrations	----
**Bulletin No. 10. A Bibliography Relating to the Geology, Paleontology and Mineral Resources of California, by Anthony W. Vogdes. 1896, 121 pp.	----
**Bulletin No. 11. Oil and Gas Yielding Formations of Los Angeles, Ventura and Santa Barbara Counties, by W. L. Watts. 1897, 94 pp., 6 maps, 31 illustrations	----
**Bulletin No. 12. Mineral Production of California, by Counties, for 1896, by Charles G. Yale. Tabulated sheet	----

BULLETINS—Continued

Asterisks (**) indicate the publication is out of print. Price (including postage and sales tax)

**Bulletin No. 13. Mineral Production of California, by Counties, for 1897, by Charles G. Yale. Tabulated sheet ----
**Bulletin No. 14. Mineral Production of California, by Counties, for 1898, by Charles G. Yale ----
**Bulletin No. 15. Map of Oil City Fields, Fresno County, by John H. Means, 1899 ----
**Bulletin No. 16. The Genesis of Petroleum and Asphaltum in California, by A. S. Cooper. 1899, 39 pp., 29 illustrations ----
**Bulletin No. 17. Mineral Production of California, by Counties, for 1899, by Charles G. Yale. Tabulated sheet ----
**Bulletin No. 18. Mother Lode Region of California, by W. H. Storms, 1900, 154 pp., 49 illustrations ----
**Bulletin No. 19. Oil and Gas Yielding Formations of California, by W. L. Watts. 1900, 236 pp., 60 illustrations, 8 maps ----
**Bulletin No. 20. Synopsis of General Report of State Mining Bureau, by W. L. Watts. 1901, 21 pp. This bulletin contains a brief statement of the progress of the mineral industry in California for the four years ending December, 1899 ----
**Bulletin No. 21. Mineral Production of California by Counties, by Charles G. Yale. 1900. Tabulated sheet ----
**Bulletin No. 22. Mineral Production of California for Fourteen Years, by Charles G. Yale. 1900. Tabulated sheet ----
**Bulletin No. 23. The Copper Resources of California, by P. C. DuBois, F. M. Anderson, J. H. Tibbits and G. A. Tweedy. 1902, 282 pp., 69 illustrations, 9 maps ----
**Bulletin No. 24. The Saline Deposits of California, by G. E. Bailey. 1902, 216 pp., 99 illustrations, 5 maps ----
**Bulletin No. 25. Mineral Production of California, by Counties, for 1901, by Charles G. Yale. Tabulated sheet ----
**Bulletin No. 26. Mineral Production of California for the Past Fifteen Years, by Charles G. Yale. 1902. Tabulated sheet ----
**Bulletin No. 27. The Quicksilver Resources of California, by William Forstner. 1903, 273 pp., 144 illustrations, 8 maps ----
**Bulletin No. 28. Mineral Production of California for 1902, by Charles G. Yale. Tabulated sheet ----
**Bulletin No. 29. Mineral Production of California for Sixteen Years, by Charles G. Yale. 1903. Tabulated sheet ----
**Bulletin No. 30. Bibliography Relating to the Geology, Paleontology and Mineral Resources of California, by A. W. Vogdes. 1903, 290 pp. ----
**Bulletin No. 31. Chemical Analyses of California Petroleum, by H. N. Cooper. 1904. Tabulated sheet ----
**Bulletin No. 32. Production and Use of Petroleum in California, by Paul W. Prutzman. 1904, 230 pp., 116 illustrations, 14 maps ----
**Bulletin No. 33. Mineral Production of California, by Counties, for 1903, by Charles G. Yale. Tabulated sheet ----
**Bulletin No. 34. Mineral Production of California for Seventeen Years, by Charles G. Yale. 1904. Tabulated sheet ----
**Bulletin No. 35. Mines and Minerals of California, by Charles G. Yale, 1904, 55 pp., 20 county maps. Relief map of California ----
**Bulletin No. 36. Gold Dredging in California, by J. E. Doolittle. 1905. 120 pp., 60 illustrations, 3 maps ----
**Bulletin No. 37. Gems, Jewelers' Materials, and Ornamental Stones of California, by George F. Kunz. 1905, 168 pp., 54 illustrations ----
**Bulletin No. 38. Structural and Industrial Materials of California, by Wm. Forstner, T. C. Hopkins, C. Naramore and L. H. Eddy. 1906, 412 pp., 150 illustrations, 1 map ----
**Bulletin No. 39. Mineral Production of California, by Counties, for 1904, by Charles G. Yale. Tabulated sheet ----
**Bulletin No. 40. Mineral Production of California for Eighteen Years, by Charles G. Yale. 1905. Tabulated sheet ----

BULLETINS—Continued

Asterisks (**) indicate the publication is out of print. Price (including postage and sales tax)

**Bulletin No. 41. Mines and Minerals of California for 1904, by Charles G. Yale. 1905, 54 pp., 20 county maps ----
**Bulletin No. 42. Mineral Production of California, by Counties, 1905, by Charles G. Yale. Tabulated sheet ----
**Bulletin No. 43. Mineral Production of California for Nineteen Years, by Charles G. Yale. Tabulated sheet ----
**Bulletin No. 44. California Mines and Minerals for 1905, by Charles G. Yale. 1907, 31 pp., 20 county maps ----
**Bulletin No. 45. Auriferous Black Sands of California, by J. A. Edman, 1907. 10 pp. ----
**Bulletin No. 46. General Index of Publications of the California State Mining Bureau, by Charles G. Yale. 1907, 54 pp. ----
**Bulletin No. 47. Mineral Production of California, by Counties, 1906, by Charles G. Yale. Tabulated sheet ----
**Bulletin No. 48. Mineral Production of California for Twenty Years, by Charles G. Yale. 1906 ----
**Bulletin No. 49. Mines and Minerals of California for 1906, by Charles G. Yale. 34 pp. ----
Bulletin No. 50. The Copper Resources of California, 1908, by A. Haus-mann, J. Kruttschnitt, Jr., W. E. Thorn and J. A. Edman, 366 pp., 74 illustrations. (Revised edition)----Price $1.50, sales tax $0.05 $1.55
**Bulletin No. 51. Mineral Production of California, by Counties, 1907, by D. H. Walker. Tabulated sheet ----
**Bulletin No. 52. Mineral Production of California for Twenty-one Years, by D. H. Walker, 1907. Tabulated sheet ----
**Bulletin No. 53. Mineral Production of California for 1907, with County Maps, by D. H. Walker, 62 pp. ----
**Bulletin No. 54. Mineral Production of California, by Counties, by D. H. Walker, 1908. Tabulated sheet ----
**Bulletin No. 55. Mineral Production of California for Twenty-two Years, by D. H. Walker, 1908. Tabulated sheet ----
**Bulletin No. 56. Mineral Production for 1908, with County Maps and Mining Laws of California, by D. H. Walker, 78 pp. ----
**Bulletin No. 57. Gold Dredging in California, by W. B. Winston and Chas. Janin. 1910, 312 pp., 239 illustrations, 10 maps ----
**Bulletin No. 58. Mineral Production of California, by Counties, by D. H. Walker. 1909. Tabulated sheet ----
**Bulletin No. 59. Mineral Production of California for Twenty-three Years, by D. H. Walker. 1909. Tabulated sheet ----
**Bulletin No. 60. Mineral Production for 1909, with County Maps and Mining Laws of California, by D. H. Walker. 94 pp. ----
**Bulletin No. 61. Mineral Production of California, by Counties, for 1910, by D. H. Walker. Tabulated sheet ----
**Bulletin No. 62. Mineral Production of California for Twenty-four Years, by D. H. Walker. 1910. Tabulated sheet ----
**Bulletin No. 63. Petroleum in Southern California, by P. W. Prutzman. 1912, 430 pp., 41 illustrations, 6 maps ----
**Bulletin No. 64. Mineral Production for 1911, by E. S. Boalich. 49 pp. ----
**Bulletin No. 65. Mineral Production for 1912, by E. S. Boalich. 64 pp. ----
**Bulletin No. 66. Mining Laws of the United States and California. 1914, 89 pp. ----
**Bulletin No. 67. Minerals of California, by Arthur S. Eakle. 1914, 226 pp. ----
**Bulletin No. 68. Mineral Production for 1913, with County Maps and Mining Laws, by E. S. Boalich. 160 pp. ----
**Bulletin No. 69. Petroleum Industry of California, with Folio of Maps (18 by 22), by R. P. McLaughlin and C. A. Waring. 1914, 519 pp., 13 illustrations, 83 figs. [18 plates in accompanying folio.] ----
**Bulletin No. 70. Mineral Production for 1914, with County Maps and Mining Laws. 184 pp. ----

BULLETINS—Continued

Asterisks (**) indicate the publication is out of print. Price (including postage and sales tax)

**Bulletin No. 71. Mineral Production for 1915, with County Maps and Mining Laws, by Walter W. Bradley, 193 pp. 4 illustrations ----

**Bulletin No. 72. The Geologic Formations of California, by James Perrin Smith. 1916, 47 pp. ----

**Reconnaissance Geologic Map (of which Bulletin 72 is explanatory), in 23 colors. Scale: 1 inch = 12 miles. Mounted ----

**Bulletin No. 73. First Annual Report of the State Oil and Gas Supervisor of California for the fiscal year 1915-16, by R. P. McLaughlin. 278 pp., 26 illustrations ----

**Bulletin No. 74. Mineral Production of California in 1916, with County Maps, by Walter W. Bradley. 179 pp., 12 illustrations ----

**Bulletin No. 75. United States and California Mining Laws. 1917, 115 pp., paper ----

Bulletin No. 76. Manganese and Chromium in California, by Walter W. Bradley, Emile Huguenin, C. A. Logan, W. B. Tucker and C. A. Waring. 1918, 248 pp., 51 illustrations, 5 maps, paper ----
Price $0.75, sales tax $0.02 $0.77

Bulletin No. 77. Catalogue of Publications of California State Mining Bureau, 1880-1917, by E. S. Boalich. 44 pp., paper ---- Free

**Bulletin No. 78. Quicksilver Resources of California, with a Section on Metallurgy and Ore-Dressing, by Walter W. Bradley. 1919, 389 pp., 77 photographs and 42 plates (colored and line cuts), cloth ----
Price $2.00, sales tax $0.06 2.06

Bulletin No. 79. Magnesite in California, by Walter W. Bradley. 1925, 147 pp., 62 photographs, 11 line cuts and maps, cloth ----
Price $1.25, sales tax $0.04 1.29

†Bulletin No. 80. Tungsten. Molybdenum and Vanadium in California. (Not issued—See Apr. 1941 Chapt. Report XXXVII.)

†Bulletin No. 81. Foothill Copper Belt of California. (Not issued.)

**Bulletin No. 82. Second Annual Report of the State Oil and Gas Supervisor, for the Fiscal Year 1916-1917, by R. P. McLaughlin. 1918, 412 pp., 31 illustrations, cloth ----

**Bulletin No. 83. California Mineral Production for 1917, with County Maps, by Walter W. Bradley. 179 pp., paper ----

**Bulletin No. 84. Third Annual Report of the State Oil and Gas Supervisor, for the Fiscal Year 1917-1918, by R. P. McLaughlin. 1918, 617 pp., 28 illustrations, cloth ----

**Bulletin No. 85. Platinum and Allied Metals in California, by C. A. Logan, 1919. 10 photographs, 4 plates, 120 pp., paper ----

**Bulletin No. 86. California Mineral Production for 1918, with County Maps, by Walter W. Bradley. 1919, 212 pp., paper ----

**Bulletin No. 87. Commercial Minerals of California, with notes on their uses, distribution, properties, ores, field tests, and preparation for market, by W. O. Castello. 1920, 124 pp., paper ----

**Bulletin No. 88. California Mineral Production for 1919, with County Maps, by Walter W. Bradley. 1920, 204 pp., paper ----

**Bulletin No. 89. Petroleum Resources of California, with Special Reference to Unproved Areas, by Lawrence Vander Leck. 1921, 12 figures, 6 photographs, 6 maps in pocket, 186 pp., cloth ----

**Bulletin No. 90. California Mineral Production for 1920, with County Maps, by Walter W. Bradley. 1921, 218 pp., paper ----

**Bulletin No. 91. Minerals of California, by Arthur S. Eakle. 1923, 328 pp., cloth ----

**Bulletin No. 92. Gold Placers of California, by Charles S. Haley. 1923, 167 pp., 36 photographs and 7 plates (colored and line cuts, also geological map), cloth ----

**Bulletin No. 93. California Mineral Production for 1922, by Walter W. Bradley. 1923, 188 pp., paper ----

**Bulletin No. 94. California Mineral Production for 1923, by Walter W. Bradley. 1924, 162 pp., paper ----

† Not issued.

BULLETINS—Continued

Asterisks (**) indicate the publication is out of print. Price (including postage and sales tax)

**Bulletin No. 95. Geology and Ore Deposits of the Randsburg Quadrangle, by Carlton D. Hulin. 1925, 152 pp., 49 photographs, 13 line cuts, 1 colored geologic map, cloth ----

**Bulletin No. 96. California Mineral Production for 1924, by Walter W. Bradley. 1925, 173 pp., paper ----

**Bulletin No. 97. California Mineral Production for 1925, by Walter W. Bradley. 1926, 172 pp., paper ----

Bulletin No. 98. American Mining Law, by A. H. Ricketts, 1931, 811 pp. flexible leather—Price $3.50, sales tax $0.11 $3.61

Bulletin No. 99. Clay Resources and Ceramic Industry of California, by Waldemar Fenn Deitrich. 1928, 383 pp., 70 photographs, 12 line cuts including maps, cloth—Price $2.00, sales tax $0.06 2.06

**Bulletin No. 100. California Mineral Production for 1926, by Walter W. Bradley, 1927, 174 pp., paper ----

**Bulletin No. 101. California Mineral Production for 1927, by Henry H. Symons. 1928, 311 pp., paper ----

**Bulletin No. 102. California Mineral Production for 1928, by Henry H. Symons. 1920, 210 pp., paper ----

Bulletin No. 103. California Mineral Production for 1929, by Henry H. Symons. 1930, 231 pp., paper ----

Bulletin No. 104. Bibliography of the Geology and Mineral Resources of California, to the end of 1930, by Solon Shedd
Price $2.50, sales tax $0.08 2.58

Bulletin No. 105. Mineral Production in California for 1930 and Directory of Producers ----

Bulletin No. 106. (See Bulletin No. 120.)

Bulletin No. 107. Mineral Production in California for 1931 and Directory of Producers ----

Bulletin No. 108. Mother Lode Gold Belt of California, by Clarence A. Logan, 1934, 240 pp., with geologic and claim maps, cloth
Price $2.25, sales tax $0.07 2.32

Bulletin No. 109. California Mineral Production and Directory of Mineral Producers for 1932, by Henry H. Symons, 200 pp., paper ----

Bulletin No. 110. California Mineral Production and Directory of Mineral Producers for 1933, by Henry H. Symons, 214 pp., paper ----

Bulletin No. 111. California Mineral Production and Directory of Mineral Producers for 1934, by Henry H. Symons, 334 pp., paper ----

Bulletin No. 112. California Mineral Production and Directory of Mineral Producers for 1935, by Henry H. Symons, 205 pp., paper ----

Bulletin No. 113. Minerals of California, by Adolf Pabst, 1938
Price $1.75, sales tax $0.05 1.80

Bulletin No. 114. California Mineral Production and Directory of Mineral Producers for 1936, by Henry H. Symons, 199 pp., paper ----

Bulletin No. 115. Bibliography of Geology and Mineral Resources of California, 1931 to 1936, Supplementing Bulletin No. 104
Price $1.25, sales tax $0.04 1.29

Bulletin No. 116. California Mineral Production and Directory of Mineral Producers for 1937—Price $0.80, sales tax $0.02 .82

Bulletin No. 117. California Mineral Production and Directory of Mineral Producers for 1938 (In press)—Price $0.80, sales tax $0.02 .82

Bulletin No. 118
Geologic Formations and Economic Development of the Oil and Gas Industry of California, by O. P. Jenkins and others
*Part One—Development of the Industry
*Part Two—Geology of California and the Occurrence of Oil and Gas
Part Three—Descriptions of Individual Oil and Gas Fields
Part Four—Glossaries, Bibliography, and Index
Subscription to four parts $3.00, sales tax $0.09 3.09

* The first and second parts may now be obtained through subscription to all four parts.

BULLETINS—Continued

Asterisks (**) indicate the publication is out of print.

	Price (including postage and sales tax)
Bulletin No. 119. Mineral Production of California for 1939, and Directory of Producers—Price $0.80, sales tax $0.02	$0.82
Bulletin No. 120. Manner of Locating and Holding Mineral Claims in California (with forms)—Price $0.25, sales tax $0.01	.26

PRELIMINARY REPORTS

**Preliminary Report No. 1. Notes on Damage by Water in California Oil Fields, December, 1913. By R. P. McLaughlin, 4 pp.	----
**Preliminary Report No. 2. Notes on Damage by Water in California Oil Fields, March, 1914. By R. P. McLaughlin, 4 pp.	----
Preliminary Report No. 3. Manganese and Chromium, 1917. By E. S. Boalich. 32 pp.	Free
**Preliminary Report No. 4. Tungsten, Molybdenum and Vanadium. By E. S. Boalich and W. O. Castello, 1918. 34 pp. Paper	----
**Preliminary Report No. 5. Antimony, Graphite, Nickel, Potash, Strontium and Tin. By E. S. Boalich and W. O. Castello, 1918. 44 pp. Paper	----
Preliminary Report No. 6. A Review of Mining in California During 1919. By Fletcher Hamilton, 1920. 43 pp. Paper	Free
**Preliminary Report No. 7. The Clay Industry in California. By E. S. Boalich, W. O. Castello, E. Huguenin, C. A. Logan, and W. B. Tucker, 1920. 102 pp. 24 illustrations. Paper	----
**Preliminary Report No. 8. A Review of Mining in California During 1921, with Notes on the Outlook for 1922. By Fletcher Hamilton, 1922. 68 pp. Paper	----

MINERAL ABSTRACTS

Pumice and Volcanic Ash, 50 pp.—Price $0.35, sales tax $0.01	.36
Sulphur, 23 pp.—Price $0.25, sales tax $0.01	.26
Tungsten, 33 pp.—Price $0.25, sales tax $0.01	.26

MISCELLANEOUS PUBLICATIONS

**First Annual Catalogue of the State Museum of California, being the collection made by the State Mining Bureau during the year ending April 16, 1881. 350 pp.	----
**Catalogue of books, maps, lithographs, photographs, etc., in the library of the State Mining Bureau at San Francisco, May 15, 1884. 19 pp.	----
**Catalogue of the State Museum of California, Volume II, being the collection made by the State Mining Bureau from April 16, 1881, to May 5, 1884. 220 pp.	----
**Catalogue of the State Museum of California, Volume III, being the collection made by the State Mining Bureau from May 15, 1884, to March 31, 1887. 195 pp.	----
**Catalogue of the State Museum of California, Volume IV, being the collection made by the State Mining Bureau from March 30, 1887, to August 20, 1890. 261 pp.	----
Lakes of California—Price $0.25, sales tax $0.01	.26
In lots of 50 or more, C. O. D.	.10
Drift Mining in California (Reprint)—Price $0.25, sales tax $0.01	.26
**Catalogue of the Library of the California State Mining Bureau, September 1, 1892. 149 pp.	----
**Catalogue of West North American and Many Foreign Shells with Their Geographical Ranges, by J. G. Cooper. Printed for the State Mining Bureau, April, 1894	----
**Report of the Board of Trustees for the four years ending September, 1900. 15 pp. Paper	----
Bulletin. Reconnaissance of the Colorado Desert Mining District. By Stephen Bowers, 1901. 19 pp. 2 illustrations. Paper—Price $0.25, sales tax $0.01	.26
Commercial Mineral Notes. A monthly mimeographed sheet, beginning April, 1923—(by mail 15c annually)	Free

Write for latest revised price list

MAPS

Register of Mines with Maps

Asterisks (**) indicate the publication is out of print.	Price (including postage and sales tax)
**Register of Mines, with Map, Amador County	----
Register of Mines, with Map, Butte County — Price $0.30, sales tax $0.01	$0.31
**Register of Mines, with Map, Calaveras County	----
**Register of Mines, with Map, El Dorado County	----
**Register of Mines, with Map, Inyo County	----
**Register of Mines, with Map, Kern County	----
**Register of Mines, with Map, Lake County	----
**Register of Mines, with Map, Mariposa County	----
Register of Mines, with Map, Nevada County	----
**Register of Mines, with Map, Placer County	----
**Register of Mines, with Map, Plumas County	----
**Register of Mines, with Map, San Bernardino County	----
Register of Mines, with Map, San Diego County	----
Register of Mines, with Map, Santa Barbara County (1906) — Price $0.30, sales tax $0.01	.31
**Register of Mines, with Map, Shasta County	----
**Register of Mines, with Map, Sierra County	----
**Register of Mines, with Map, Siskiyou County	----
**Register of Mines, with Map, Trinity County	----
**Register of Mines, with Map, Tuolumne County	----
Register of Mines, with Map, Yuba County (1905) — Price $0.30, sales tax $0.01	.31
**Register of Oil Wells, with Map, Los Angeles City (1906)	----

OTHER MAPS

**Map of California, Showing Mineral Deposits (50x60 in.)	----
**Map of Forest Reserves in California	----
**Mineral and Relief Map of California	----
**Map of El Dorado County, Showing Boundaries, National Forests	----
**Map of Madera County, Showing Boundaries, National Forests	----
**Map of Placer County, Showing Boundaries, National Forests	----
**Map of Shasta County, Showing Boundaries, National Forests	----
**Map of Sierra County, Showing Boundaries, National Forests	----
**Map of Siskiyou County, Showing Boundaries, National Forests	----
**Map of Tuolumne County, Showing Boundaries, National Forests	----
**Map of Mother Lode Region	----
**Map of Desert Region of Southern California	----
Map of Minaret District, Madera County—Price $0.25, sales tax $0.01	.26
**Map of Copper Deposits in California	----
**Map of Calaveras County	----
**Map of Plumas County	----
**Map of Trinity County	----
**Map of Tuolumne County	----
**Geographical Map of Inyo County. Scale 1 inch equals 4 miles	----
**Map of California accompanying Bulletin No. 89, showing generalized classification of land with regard to oil possibilities. Map only, without Bulletin	----
**Geologic Map of California, 1916. Scale 1 inch equals 12 miles. Shows railroads, highways, post offices and other towns. Geological details lithographed in 23 colors. Mounted	----
**Unmounted	----
Geologic Map of California, 1938. Scale 8 miles per inch. Lithographed in 80 distinguishing colors and patterns showing geologic units. In 6 sections, each 32 in. x 42 in. Set of 6 sheets, unmounted. Sheets not sold separately—Price $4.00, sales tax $0.12	4.12
**Topographic Map of Sierra Nevada Gold Belt, showing distribution of auriferous gravels, accompanying Bulletin No. 92. In 4 colors (also sold singly)	----

OTHER MAPS—Continued

Asterisks, (**) indicate the publication is out of print.	Price (including postage and sales tax)
Geologic Map of Northern Sierra Nevada, showing Tertiary River Channels and Mother Lode Belt accompanying July-October Chapter of Report XXVIII of the State Mineralogist. (Sold singly)—Price $0.40, sales tax $0.01	$0.41
Map of Northern California, showing rivers and creeks which produced placer gold in 1932—Price $0.25, sales tax $0.01	.26
Mother Lode Geologic and claim maps in 5 county sections: El Dorado, Amador, Calaveras, Tuolumne and Mariposa. Single sections .25c. Set of 5—Price $1.00, sales tax $0.03	1.03
Map of Mariposa County, showing principal gold mines—Price $0.25, sales tax $0.01	.26
Geologic Map of Elizabeth Lake Quadrangle, Los Angeles and Kern Counties (accompanying October Chapter of Report XXX), sold separately—Price $0.25, sales tax $0.01	.26
Map of Western Portion of Siskiyou County Showing Location of Principal Gold Mines (accompanying July Chapter of Report XXXI), sold separately—Price $0.25, sales tax $0.01	.26
Geologic Map of Redding and Weaverville Quadrangles Showing Location of Gold Mines—Price $0.25, sales tax $0.01	.26
**Map of Ancient Channel System, Calaveras County	----
**Map of Ancient Channels Between San Andreas and Mokelumne Hill	----
Elizabeth Lake Quadrangle—Price $0.25, sales tax $0.01	.26
Minaret—Price $0.25, sales tax $0.01	.26
Perris Block Geologic—Price $0.25, sales tax $0.01	.26
Plumas County Geologic—Price $0.25, sales tax $0.01	.26
Shasta County Geologic—Price $0.25, sales tax $0.01	.26
El Dorado County—Price $0.25, sales tax $0.01	.26
Trinity County, Showing Locations of Principal Mineral Deposits (accompanying Jan. Chapt. of Report XXXVII—Price $0.25, sales tax $0.01	.26
Quicksilver deposits, sold in conjunction with Oct. 1939, Chapter of Report XXXV—Price $0.50, sales tax $0.02	.52

OIL FIELD MAPS

The maps are revised from time to time as development work advances and ownerships change.

Map No. 1—Sargent, Santa Clara County—Price $0.75, sales tax $0.02	.77
Map No. 2—Santa Maria, including Cat Canyon and Los Alamos—Price $1.25, sales tax $0.04	1.29
Map No. 3—Santa Maria, including Casmalia and Lompoc—Price $1.25, sales tax $0.04	1.29
Map No. 4—Brea Olinda and (East Portion) Coyote Hills, Los Angeles and Orange Counties—Price $1.25, sales tax $0.04	1.29
Map No. 6—Salt Lake-Beverly Hills, Los Angeles County—Price $1.25, sales tax $0.04	1.29
Map No. 7—Sunset and San Emidio, Kern County—Price $1.25, sales tax $0.04	1.29
Map No. 8—South Midway and Buena Vista Hills, Kern County—Price $1.25, sales tax $0.04	1.29
Map No. 9—North Midway and McKittrick, Kern County—Price $1.25, sales tax $0.04	1.29
Map No. 10—Belridge and McKittrick Front, Kern County—Price $1.25, sales tax $0.04	1.29
Map No. 11—Lost Hills and North Belridge, Kern County—Price $1.25, sales tax $0.04	1.29
Map No. 12—Devils Den, Kern County—Price $1.00, sales tax $0.03	1.03
Map No. 13—Kern River, Kern County—Price $1.00, sales tax $0.03	1.03
Map No. 14—Coalinga and E. Coalinga Extension, Fresno County—Price $1.50, sales tax $0.05	1.55
Map No. 15—Elk Hills, Kern County—Price $1.25, sales tax $0.04	1.29
Map No. 16—Ventura-Ojai, Ventura County—Price $1.25, sales tax $0.04	1.29

OIL FIELD MAPS—Continued

The maps are revised from time to time as development work advances and ownerships change.

	Price (including postage and sales tax)
Map No. 17—Santa Paula-Sespe, including Bardsdale, South Mountain and Camarillo, Ventura County—Price $1.25, sales tax $0.04	$1.29
Map No. 18—Piru-Simi-Newhall, Ventura County—Price $1.25, sales tax $0.04	1.29
Map No. 19—Arroyo Grande, San Luis Obispo County—Price $1.00, sales tax $0.03	1.03
Map No. 20—Long Beach, Los Angeles County—Price $1.75, sales tax $0.05	1.80
Map No. 21-B—Portion of District No. 5, showing boundaries of oil fields—Fresno, Kings and Kern Counties—Price $1.00, sales tax $0.03	1.03
Map No. 21-C—Portion of District No. 4, showing boundaries of oil fields—Kern, Kings and Tulare Counties—Price $1.25, sales tax $0.04	1.29
Map No. 22—Portion of District No. 3, showing boundaries of oil fields—Santa Barbara County—Price $0.75, sales tax $0.02	.77
Map No. 23—Portion of District No. 2, showing boundaries of oil fields—Ventura County—Price $1.00, sales tax $0.03	1.03
Map No. 24—Portion of District No. 1, showing boundaries of oil fields—Los Angeles and Orange Counties—Price $1.00, sales tax $0.03	1.03
Map No. 26—Huntington Beach, Orange County—Price $1.50, sales tax $0.05	1.55
Map No. 27—Santa Fe Springs, Los Angeles County—Price $1.25, sales tax $0.04	1.29
Map No. 28—Torrance, Los Angeles County—Price $1.25, sales tax $0.04	1.29
Map No. 29—Dominguez, Los Angeles County—Price $1.00, sales tax $0.03	1.03
Map No. 30—Rosecrans, Los Angeles County—Price $1.25, sales tax $0.04	1.29
Map No. 31—Inglewood, Los Angeles County—Price $1.25, sales tax $0.04	1.29
Map No. 32—Seal Beach, Los Angeles and Orange Counties—Price $1.25, sales tax $0.04	1.29
Map No. 33—Rincon, Ventura County—Price $1.50, sales tax $0.05	1.55
Map No. 34—Mt. Poso and Poso Creek, Kern County—Price $1.00, sales tax $0.03	1.03
Map No. 35—Round Mountain, Kern County—Price $1.00, sales tax $0.03	1.03
Map No. 36—Kettleman Hills, Fresno, Kings and Kern Counties—Price $1.50, sales tax $0.05	1.55
Map No. 37—Montebello, Los Angeles County—Price $1.00, sales tax $0.03	1.03
Map No. 38—Whittier, Los Angeles County—Price $1.25, sales tax $0.04	1.29
Map No. 39—West Coyote, Los Angeles and Orange Counties—Price $1.25, sales tax $0.04	1.29
Map No. 40—Elwood, Santa Barbara County, and La Goleta, Santa Barbara County—Price $1.25, sales tax $0.04	1.29
Map No. 41—Potrero, Los Angeles County—Price $1.00, sales tax $0.03	1.03
Map No. 42—Playa del Rey, Los Angeles County—Price $1.50, sales tax $0.05	1.55
Map No. 43—Capitan, Santa Barbara County—Price $1.00, sales tax $0.03	1.03
Map No. 44—Mesa, Santa Barbara County—Price $1.50, sales tax $0.05	1.55
Map No. 46—Richfield, Orange County—Price $1.25, sales tax $0.04	1.29
Map No. 48—Mountain View and Edison, Kern County—Price $1.25, sales tax $0.04	1.29
Map No. 49—Fruitvale, Kern County—Price $1.00, sales tax $0.03	1.03
Map No. 50—Wilmington, Los Angeles County—Price $1.25, sales tax $0.04	1.29
Map No. 51—Santa Maria Valley, Santa Barbara County—Price $1.00, sales tax $0.03	1.03
Map No. 52—El Segundo and Lawndale, Los Angeles County—Price $1.50, sales tax $0.05	1.55

OIL FIELD MAPS—Continued

The maps are revised from time to time as development work advances and ownerships change.

		Price (including postage and sales tax)
Map No. 53—Rio Bravo, Greeley, Kern County	Price $1.25, sales tax $0.04	$1.29
Map No. 54—Wasco Oil Field, Buttonwillow and Semitropic Gas Fields, Kern County	Price $1.25, sales tax $0.04	1.29
Map No. 55—Canal, Canfield Ranch, Coles Levee, Strand, and Ten Section, Kern County	Price $1.25, sales tax $0.04	1.29
Map No. 56—Paloma, Kern County	Price $1.25, sales tax $0.04	1.29

DETERMINATION OF MINERAL SAMPLES

Samples (limited to two at one time) of any mineral found in the State may be sent to the Division of Mines for identification, and the same will be classified free of charge. No samples will be determined if received from points outside the State. It must be understood that no assays, or quantitative determinations will be made. Samples should be in lump form if possible, and marked plainly with name of sender on outside of package, etc. No samples will be received unless delivery charges are prepaid. A letter should accompany sample, giving locality where mineral was found and the nature of the information desired.

INDEX

Page

Acreage proven oil and natural gas land ... 31
Agricultural limestone ... 96
Alameda County ... 122
Alpine County ... 122
Alum (native) ... 111
Aluminum ... 32–33
Amador County ... 123
Amblygonite ... 97
American Petroleum Institute, cited ... 23–24
American Potash and Chemical Co., well of, photos of ... 117
Andalusite ... 105
Antimony ... 33
  producers ... 148
  total production ... 33
  use of ... 33
Appendix ... 199–219
Architectural terra cotta ... 86
Arsenic ... 33
Art pottery ... 86
Asbestos ... 80–81
  use ... 80
Ash, volcanic ... 101–102
Asphalt ... 59–60
Bancroft, H. H., cited ... 41
Barite ... 81–82
  duty on ... 81
  producers ... 148
  total production ... 82
Ballast, railroad ... 77
Bauxite ... 32
Benitoite ... 92
Bentonite ... 82–83
  producers ... 149
  total production ... 83
Beryl ... 34, 92
Beryllium ... 34
Bismuth ... 34
  use of ... 34
Bituminous rock ... 60
  producers ... 149
  total production ... 60
Borates ... 111–113
  exports ... 112
  producers ... 150
  production, 1864-1940 ... 113
Bradley, Walter W., cited ... 39, 42, 52, 56, 63, 74, 104, 109, 117, 120
Brick ... 61–62
  producers ... 154–157
  production of various kinds ... 61
  total production, 1893-1940 ... 62
Bromine ... 113–114
  producers ... 150
Brown, J. R., cited ... 38, 42
Building stone. (*See* Granite, Marble, Sandstone, etc.)
Butte County ... 123
Cadmium ... 35
Calaveras County ... 124
Calcium chloride ... 114
    producer ... 150
  silicate ... 83–84
    producer ... 151
California, area of ... 121
  Oil and Gas Association, cited ... 20
Californite ... 92
Carbon dioxide gas (natural) produced ... 84
  producers ... 151
Carmel stone ... 70
Casinghead gas ... 18
Celestite ... 108
Cement ... 62–64
  natural ... 63
  producers ... 152
  total production ... 63
Chemical stoneware ... 86

Page

Chimney pipe ---- 86
Chinaware ---- 86
Chromite ---- 35–36
  imports of ---- 36
  occurrence of ---- 35
  producers ---- 153
  total production ---- 36
  use of ---- 36
Chrysoprase ---- 93
Clay for oil well drilling mud ---- 86
Clay, pottery ---- 84–87
  producers ---- 154–157
  production, 1887-1940 ---- 87
  products ---- 86
  uses of, other than for pottery ---- 86
Coal ---- 15–16
  producer ---- 158
  total production of ---- 16
Cobalt ---- 37
Colemanite ---- 112
Colusa County ---- 124
Concrete, rock for ---- 77
Conduit ---- 86
Conveyor belt to Shasta Dam, photo of ---- 74
Contra Costa County ---- 124
Copper ---- 37–38
  producers ---- 158
  production, 1882-1940 ---- 38
  United States, production of ---- 38
Counties, mineral production of ---- 13, 121–145
Cronise, T. F., cited ---- 100
Crushed rock ---- 76–77
  producers ---- 188–195
Cryolite ---- 32
Curying ---- 64
Day, D. T., cited ---- 36
Del Norte County ---- 125
Department of Natural Resources Code ---- 200–201
Diamonds ---- 92
Diatomaceous earth. (*see* diatomite.)
Diatomite ---- 88–89
  producers ---- 159
  total production of ---- 89
Directory of producers ---- 147–198
Dolomite ---- 89–90
  producers ---- 159
  total production ---- 90
Drain tile ---- 86
Dumortierite ---- 105
Duty on barytes ---- 81
  fuller's earth ---- 83
  glass sand ---- 105
  magnesite ---- 67
  manganese ---- 47
  molybdenum ---- 48
  soapstone and talc ---- 106
  tungsten ---- 56
El Dorado County ---- 125
Electric smelting of ferro alloys ---- 36
Electrical porcelain ---- 86
Eng. and Min. Jour., cited ---- 46, 50
Exports of borates ---- 112
Faience tile ---- 86
Feldspar ---- 90–91
  producer ---- 160
  total production ---- 91
Ferro-chrome by electric furnace ---- 36
  -manganese by electric furnace ---- 36
  -silicon by electric furnace ---- 36
Fertilizers. (*See* Gypsum, Limestone, Phosphates, Potash.)
Fire brick ---- 61
  clay ---- 86
Flue linings ---- 86
Fluorspar ---- 91
Fresno County ---- 126
Fuels ---- 15–31
Fuller's earth. (*See* Bentonite.)
  duty on ---- 83
  producers ---- 149
Garnets (abrasive) ---- 91
Garnets (gem) ---- 93
Gas. (*See* Natural gas.)
Gasoline from natural gas ---- 18–19
Gaylord, H. M., cited ---- 39–41, 53

Page

Gems ---- 92–93
producers ---- 160
total production ---- 93
varieties ---- 92–93
Glass sand ---- 103–105
duty on ---- 105
Glenn County ---- 126
Gold ---- 37–43
number of operating properties ---- 39, 40
principal producers ---- 161–168
production by counties, 1940 ---- 40
Reserve Act, cited ---- 43
total production ---- 42–43
value 1887-1940 ---- 14
Goodyear, W. A., cited ---- 16
Granite ---- 64–65
decomposed ---- 77
producers ---- 169
production, 1887-1940 ---- 65
varieties of, in California ---- 65
Granules for roofing and stucco ---- 77
Graphite ---- 93–94
total production ---- 94
Gravel ---- 76–77
Grinding-mill pebbles ---- 74
producer ---- 192
Gypsum ---- 94–95
producers ---- 170
total production ---- 95
Hanks, Henry, cited ---- 21
Hittell, T. H., cited ---- 41
Hollow building tile or blocks ---- 61
Hübernite ---- 56
Humboldt County ---- 126
Imperial County ---- 127
Imports of Chromite ---- 36
Magnesite ---- 67
Manganese ---- 46
Potash ---- 117
Quicksilver ---- 50
Talc and soapstone ---- 106
Tungsten ---- 56
Industrial limestone ---- 95
Industrial materials ---- 79–110
Infusorial earth ---- 88
Introduction ---- 9
Inyo County ---- 127
Iodine ---- 114–115
producers ---- 171
Iridium. (*See* Platinum.)
Iron ore ---- 44
producers ---- 171
total production ---- 44
Jewelers' materials. (*See* Gems.)
Kern County ---- 128
Kernite ---- 112
Keystone Mine, Amador County, photo of ---- 42
Kieselguhr ---- 88
Kings County ---- 128
Knudsen, E. T., cited ---- 19, 26
Kramerite ---- 112
Kunzite ---- 92
Kyanite ---- 105
Lake County ---- 129
Lassen County ---- 129
Lead ---- 45–46
producers ---- 172
production, 1877-1940 ---- 46
of United States ---- 45
Lepidolite ---- 97
Letter of Transmittal ---- 7
Leviathan Sulphur Mine, Alpine County, photo of ---- 109
Lime ---- 66
producers ---- 173
production, 1894-1940 ---- 66
Limestone ---- 95–96
producers ---- 173
production, 1894-1940 ---- 96
Lithia ---- 97
producer ---- 174
Los Angeles Brick and Clay Co., plant, photo of ---- 87
Los Angeles County ---- 129–130
Macadam ---- 77
Madera County ---- 130

Page

Magnesite ---- 66–68
duty on ---- 67
imports of ---- 67
occurrence of ---- 67
producers ---- 174
production, 1887-1940 ---- 68
Magnesium salts ---- 115–116
producers ---- 174
production by years ---- 116
Manganese ---- 46–47
duty on ---- 47
imports of ---- 46
producers ---- 175
total production ---- 47
Marble ---- 68–69
producers ---- 175
production, 1887-1940 ---- 69
Marin County ---- 130
Mariposa County ---- 131
Medicinal salts ---- 118
McCaskey, H. D., cited ---- 53
Mendocino County ---- 131
Mercantile Trust Review, cited ---- 42, 64
Merced County ---- 131–132
Merrill, Charles White, cited ---- 39–41, 53
Metal & Mineral Markets, cited ---- 33, 34, 35, 37, 48, 49, 55, 56, 57
Metals ---- 32–58
Mica ---- 97–98
producer ---- 175
uses ---- 98
Mineral Yearbook, cited ---- 41, 53, 63
Minerals, county ---- 13, 121–145
industry, review of ---- 11–14
output by counties ---- 13, 121–145
by substances ---- 12
output, comparative value, 1939-1940 ---- 12
paint ---- 99
production, 1890-1937 ---- 99
production, 1887-1940 ---- 14
variety of, produced in California ---- 11–12
water ---- 99–100
producers ---- 176–177
production, 1887-1939 ---- 100
Mineral Resources West of Rocky Mountains, cited ---- 38
Mining and Scientific Press, cited ---- 22
Mines and Mining, code ---- 201–202
Miscellaneous stone ---- 72–78
producers ---- 188–195
production, 1893-1940 ---- 78
Modoc County ---- 132
Molding sand ---- 75
Molybdenum ---- 47–48
duty on ---- 48
producer ---- 177
Mono County ---- 132
Monterey County ---- 133
Montmorillonite ---- 83
Monumental stone ---- 64
Names of producers in ---- 147–198
Napa County ---- 133
Natural gas ---- 16–19
amount produced, utilized, wasted and stored ---- 17
distribution by counties ---- 17
gasoline from ---- 18–19
production, 1888-1940 ---- 18
production and value ---- 17
Natural Soda Products Co. pond, photo of ---- 120
Nevada County ---- 133–134
Nickel ---- 48
Nitrates ---- 116
Nitrogen, atmospheric, fixation of ---- 116
Oil. (*See* Petroleum.)
in storage ---- 24
land, proven ---- 31
shale ---- 103
utilization of ---- 26
well data ---- 23–24
well drilling mud ---- 86
wells operated by fields ---- 23–24, 28–30
Onyx ---- 69
Orange County ---- 134
Ore and metal buyers ---- 198
Osmium. (*See* Platinum.)

Page
Palladium. (*See* Platinum.)
Paving blocks ---- 76
Peat ---- 15
Pebbles for grinding mills ---- 72
Permanente Cement Plant at Los Altos, photo of ---- 63
Petroleum ---- 19–31
average price by counties, 1930-1940 ---- 20
number of producing wells ---- 27–30
operating data ---- 26–30
production, 1875-1940 ---- 21–22
production and value by counties ---- 20
production by fields ---- 25
production of light and heavy gravities ---- 25
products, production of ---- 26
specific gravity of ---- 20, 24
statistics of well operations ---- 23–24, 28–30
storage of ---- 24
total production ---- 21–22
value, 1887-1940 ---- 14
yield per day of wells ---- 28–30
Phosphates ---- 101
Pine Creek Tungsten Mine, photo of ---- 56
Placer County ---- 134–135
Plaster and brick sand ---- 75
Platinum ---- 49
prices ---- 49
producers ---- 178
production of, 1887-1940 ---- 49
Plumas County ---- 135
Porcelain ---- 86
Potash ---- 116–118
imports ---- 117
producer ---- 178
total production of ---- 118
Pottery clays ---- 86
Probertite ---- 112
Public Resources Code ---- 199–202
Publications of Division of Mines, list of ---- 203–220
Pumice ---- 101–102
producers ---- 179
total production ---- 102
Pyrites ---- 102–103
producer ---- 179
total production ---- 103
Pyroxine ---- 84
Quartz ---- 103–105
crystals. (*See* Gems.)
Quicksilver ---- 50–51
imports ---- 50
prices ---- 50
producers ---- 180–181
production, 1850-1940 ---- 51
production of, in United States ---- 50
Randol, J. B., cited ---- 51
Rasorite ---- 112
Red earthenware ---- 86
Rhodonite ---- 93
Riprap ---- 77
Riverside County ---- 135
Rock, crushed ---- 76–77
Roofing granules ---- 77
slate ---- 71
tile ---- 86
Rubble ---- 77
Rubies ---- 93
Ruthenium. (*See* Platinum.)
Sacramento County ---- 130
Salinas ---- 110–120
Salt ---- 118–119
producers ---- 182
production, 1887-1940 ---- 119
Salt Cake ---- 119
San Benito County ---- 136
San Bernardino County ---- 136–137
San Diego County ---- 137
San Francisco Bulletin, cited ---- 21
County ---- 137
San Joaquin County ---- 138
San Luis Obispo County ---- 138
San Mateo County ---- 138–139
Sand, glass ---- 103–105
Sand and gravel ---- 74–75
producers ---- 188–195

Page
Sandstone ---- 70
producers ---- 183
production, 1887-1940 ---- 70
Sanitary ware ---- 86
Santa Barbara County ---- 139
Santa Clara County ---- 139–140
Santa Cruz County ---- 140
Sapphires ---- 93
Scheelite ---- 56
Scoria ---- 101
Semivitreous tableware ---- 86
Serpentine ---- 70–71
Sewer pipe ---- 86
Shale oil ---- 103
Shasta County ---- 140
Siebenthal, C. E., cited ---- 46
Sierra County ---- 141
Silica ---- 103–105
producers ---- 183
total production ---- 105
Sillimanite group ---- 105–106
producer ---- 184
Silver ---- 51–54
principal producers ---- 184–185
production by counties ---- 52
production, 1880-1940 ---- 54
Siskiyou County ---- 141
Slate ---- 71–72
producers ---- 186
production, 1889-1940 ---- 72
roofing granules ---- 71
Smelters, list of ---- 198
Soapstone ---- 106–108
composition ---- 106
duty on ---- 106
imports of ---- 106
producers ---- 186
total production ---- 108
use ---- 107
varieties ---- 106
Soda ---- 119–120
producers ---- 187
total production ---- 120
Solano County ---- 141–142
Sonoma County ---- 142
Spark plugs, andalusite for ---- 105
Specific gravities of oil produced ---- 24
Spelter. (*See* Zinc.)
Standard Oil Company, cited ---- 24, 25
Stanislaus County ---- 142
State Division of Oil and Gas, cited ---- 26, 30, 31
State Mineralogist Report, cited ---- 51
Mining Bureau, cited ---- 44
Oil and Gas, cited ---- 19–20
Stone, miscellaneous ---- 72–78
producers ---- 188–195
production by counties ---- 77
production by years ---- 78
Stoneware ---- 86
Strontium ---- 108–109
producers ---- 196
Structural materials ---- 59–78
Sulphur ---- 109–110
producers ---- 196
production by years ---- 110
Summary of Mineral Industry, 1940 ---- 11–12
Summary of Operations, California Oil Fields, cited ---- 26–30
Sutter County ---- 143
Talc ---- 106–108
duty on ---- 106
producers ---- 186
uses ---- 107
Tariff Act of 1930, cited ---- 47, 48, 67, 81, 83, 105, 106
Tehama County ---- 143
Terra cotta ---- 86
Tile ---- 86
Tin ---- 54
Titanium ---- 55
producer ---- 196
Topaz ---- 92
Tourmaline ---- 92
Travertine ---- 69
Trinity County ---- 143
Trona ---- 112
Tube mill pebbles ---- 72
Tuff, used for building stone ---- 64

Page
Tulare County ---- 144
Tungsten ---- 55–57
duty on ---- 56
imports ---- 56
producers ---- 197
quotations ---- 56
total production ---- 57
Tuolumne County ---- 144
Turquoise ---- 93
U. S. Bureau of Foreign and Domestic Commerce, cited ---- 36, 46, 50, 56, 67, 106, 112
U. S. Bureau of Mines, cited ---- 19, 22, 26, 28, 39, 41, 43, 44, 45, 50, 53, 58, 63
Census Bureau, cited ---- 121
Geological Survey, cited ---- 16, 22, 36, 38, 46, 67
Vanadium ---- 57
Ventura County ---- 144–146
Vitrified brick ---- 61
Volcanic ash ---- 101–102
producers ---- 179
Weisel Sand Plant near Corona, photo of ---- 104
Well data ---- 23–24
Witherite ---- 82
Wolframite ---- 56
Wollastonite ---- 84
Yale, Chas. D., cited ---- 42
Yellow Aster Gold Mine, photo of ---- 39
Yolo County ---- 145
Yuba County ---- 145
Zinc ---- 57–58
producers ---- 198
production of United States ---- 58
total production ---- 58
Zircon ---- 110
producer ---- 197

o

7379 2-42 1500